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*John Hoskyns*, V.P.R.S.

# An ESSAY toward a Natural History OF THE EARTH: AND Terreſtrial Bodies, Eſpecially MINERALS:

As alſo of the

Sea, Rivers, *and* Springs.

With an Account of the

UNIVERSAL DELUGE:

And of the *Effects* that it had upon the

EARTH.

By *John Woodward*, M. D. Profeſſor of Phyſick in *Greſham-College*, and Fellow of the *Royal Society*.

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To the Honourable
Sir *Robert Southwell*, Knight,
Preſident of the *Royal Society*.

*SIR*,

THE Subject of theſe following Papers being *Philoſophical*, and ſo not foreign to the Converſations you frequent, I could not direct them better than to the Perſon whom the *Royal Society* have ſo often made choice of to fill their Chair. For tho' your Buſineſs hath been much in the open World, yet am I well aſſured that Things of this Nature have always been your Recreation and Delight. The Truth is, your Attention to hear me diſcourſe of my Travels under Ground, and the Uſes I propoſed of what there I found, gave me no ſmall Encouragement to expoſe my Obſervations to the publick View: And 'tis my Hope, that thoſe Things may find Pardon from others, which have had Approbation with you. I am very truly,

SIR,

Your moſt humble Servant,

*J. WOODWARD.*

# PREFACE.

*Having in the Eſſay it ſelf given ſome Intimation both of the Deſign of it, and the Reaſons which induced me to make it publick, I ſhall not here keep the* Reader *in ſuſpenſe much longer than only while I acquaint him that, propoſing to draw a conſiderable number of Materials into ſo narrow a Compaſs that they might all be contained in this ſmall Volume, I was obliged to be very brief and conciſe. And therefore, as Pieces of Miniature, Sculpture, or other Workmanſhip in little, muſt be allowed a cloſer Inſpection, ſo this Treatiſe will require ſome Care and Application in the Peruſal.*

*Not but that I have endeavoured, as far as was practicable in ſo little Room, ſo* to diſpoſe and order things, by interweaving with the Aſſertions ſome of the Proofs whereon they depend, and occaſionally ſcattering ſeveral of the more important Obſervations throughout the Work, that it will be no very hard Task for any one to diſcover the main Grounds whereon all that I here advance is founded.

That this may be the more clearly apprehended, I ſhall beg leave to illuſtrate it by one or two Inſtances. It will perhaps at firſt ſight ſeem very ſtrange, and almoſt ſhock an ordinary Reader to find me aſſerting, as I do, that the whole Terreſtrial Globe was taken all to pieces and diſſolved at the Deluge, the Particles of Stone, Marble, and all other ſolid Foſſils diſſevered, taken up into the Water, and there ſuſtained together with Sea-ſhells and other Animal and Vegetable Bodies: and that the preſent Earth conſiſts, and was formed out of that promiſcuous Maſs of Sand, Earth, Shells, and the reſt, falling down again, and ſubſiding from the Water. But whoever ſhall duely attend to what I elſewhere lay down, viz. that there are vaſt Multitudes of Shells, and other Marine Bodies, found at this day incorporated with and lodged in all ſorts of Stone, in Marble, in Chalk, and to be ſhort, in all the other ordinary Matter of the Globe which is cloſe and compact enough to preſerve them: that theſe are found thus repoſited amongſt this Terreſtrial Matter from near the Surface of the Earth downwards to the greateſt Depth we ever dig or lay it open, and this in all Parts of it quite round the Globe: that the ſaid terreſtrial Matter is diſpoſed into Strata or Layers, placed one upon another, in like manner as any earthy Sediment, ſetling down from a Fluid in great quantity, will naturally be: that theſe Marine Bodies are now found lodged in theſe Strata according to the Order of their Gravity, thoſe which are heavieſt lying *deepeſt in the Earth, and the lighter ſorts (when there are any ſuch in the ſame place) ſhallower or nearer to the Surface: and both thoſe and theſe amongſt terreſtrial Matter which is of the ſame Specifick Gravity that they are, the heavier Shells in Stone, the lighter in Chalk, and ſo of the reſt; I ſay, whoever ſhall but rightly weigh all this, he'll have no need to go further for Proof that the Earth was actually ſo diſſolved, and afterwards framed a-new, in ſuch manner as I have ſet forth. And if to this he ſhall think fit to add the other Arguments of the ſame Thing which he will meet with in their Place, they alſo will I hope not fail of doing their Part in convincing him ſtill more of the Truth and Certainty of this Matter.*

*The other Inſtance I make choice of ſhall be of the Univerſality of the Deluge, which is another Propoſition that I inſiſt upon. And for this, let but the Reader pleaſe to conſider, what I deliver from authentick*

*Relations, that the marine Bodies aforeſaid are found in all Parts of the known World, as well in* Europe, Africa, *and* America, *as in* Aſia, *and this even to the very tops of the higheſt Mountains; and then I think he cannot reaſonably doubt of the Propoſition: but more eſpecially if hereunto he ſhall joyn what I offer concerning the Great Abyſs, and thence learns that there is at this day reſident, in that huge Conceptacle, Water enough to effect ſuch a Deluge, to drown the whole Globe, and lay all, even the higheſt Mountains under Water. But if he ſhould be at a loſs to know how I got ſuch Notice of that ſubterranean Reſervatory, as to enable me to make a Computation of the Quantity of Water now conceal'd therein, if he carefully peruſe the Propoſitions concerning Earthquakes, and ſome others in the Third Part, he cannot but diſcover at leaſt ſome of the ways whereby I got light thereinto: and at the ſame time find why it is that I am ſo par-*

*ticular in relating the* Phænomena *of Earthquakes, and dwell ſo long upon that Subject in this ſhorter Work.*

*Theſe I intend for Example and Direction to the* Reader *how he may ſatisfie himſelf in any of the other Heads. 'Tis impoſſible for me to foreſee the Difficulties and Hæſitations of every one: they will be more or fewer, according to the Capacity of each Peruſer, and as his Penetration and Inſight into Nature is greater or leſs. They who have Attention enough to take in the intire Platform as here laid down: who ſee the Chain which runs through the whole: and can pick up and bear in mind the Obſervations and Proofs here and there as they lie, and then confer them with the Propoſitions, will diſcern (in great meaſure) how theſe Propoſitions flow from them: but they who cannot ſo eaſily do this muſt be intreated to have a little patience, untill the Thing be further unfolded, and more amply and plainly made out.*

*A few Advances there are in the following Papers, tending to aſſert the Superintendence and Agency of Providence in the Natural World: as alſo to evince the Fidelity and Exactneſs of the Moſaick Narrative of the Creation, and of the Deluge. Which 'tis not improbable but ſome may be apt to ſtumble at, and think ſtrange that in a Phyſical Diſcourſe as this is, I ſhould intermeddle with Matters of that kind. But I may very ſafely ſay, that, as to the former, I have not entered farther into it than meerly I was lead by the neceſſity of my Subject: nor could I have done leſs than I have, without the moſt apparent Injury and Injuſtice to Truth. And for* Moſes, *he having given an Account of ſome Things which I here treat of, I was bound to allow him the ſame Plea that I do other Writers, and to conſider what he hath delivered. In order to this I ſet aſide every thing that might byaſs my Mind, over-awe, or miſlead me in the*

*Scrutiny, and therefore have regard to him here only as an Hiſtorian. I freely bring what he hath related to the Teſt, comparing it with Things as now they ſtand: and finding his Account to be punctually true, I fairly declare what I find; wherein I do him but ſimply Right, and ply the ſame that I would to a common Hiſtorian, to* Beroſus *or* Manetho, *to* Herodotus *or* Livy, *on like occaſion.*

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### *ERRATA.*

PAge 19. Line 6. after *Buccina* add (,) p. 32. l. 3 for *Cruſtaneous* read *Cruſtaceous* p. 61. l. 23. after *firm* add (,) p. 75. l. 14. after *precipitated* add (,) p. 94 l. 6. after *been* add *given*. p. 168. l. 25. f. *Alargat* r. *Atargatis*. p. 173. l. 10. (in the Margin) f. *it* r. *th* *ſaid Stone*. p. 184. l. 13. f. *Cochitæ* r. *Conchitæ*. p. 243. l. 21. f. *the* r. *that*. p. 270. l. 2. f. *frigitive* r. *fugitive*. p. 275. l. 12. ( in the Margin ) f. *the* r. *that*.

# AN ACCOUNT OF THE OBSERVATIONS Upon which this DISCOURSE Is Founded.

FROM a long train of Experience, the World is at length convinc'd, that Obſervations are the only ſure Grounds whereon to build a laſting and ſubſtantial Philoſophy. All Parties are ſo far agreed upon this matter, that it ſeems to be now the common ſenſe of Mankind.

For which reaſon, I ſhall in the Work before me, give my ſelf up to be guided wholly by *Matter of Fact*; as intending to ſteer that courſe which is thus agreed of all hands to be the beſt and ſureſt: and not to offer any thing but what hath due warrant from Obſervations; and thoſe both carefully made, and faithfully related.

And that each Reader may the better inform himſelf, not only of what ſort my preſent Obſervations are, but ſee in what manner alſo, and with what kind of Accuracy they were made, 'twill be convenient to give ſome light into that matter, and to begin with an Account of them; whereby he may be enabled to judge how far they may be relyed upon, and what meaſure of Aſſent the Propoſitions which I draw from them may claim.

But before I go any farther, I ought to put in a Caution, that an ample and prolix Relation either of the Obſervations themſelves, or of the Deductions from them, is not to be expected here. I deſign *this* but for a Sample of what I hope, in good time, more fully to diſcuſs and make out: propoſing no more in this Treatiſe, than only, in a few plain words, to deliver my Sentiments on certain Heads of Natural

Hiſtory, with ſome of the Reaſons and Grounds of them; in order to give ſomewhat of preſent Satisfaction to the Curioſity and Demands of ſome of my Friends.

The Obſervations I ſpeak of were all made in *England*; the far greateſt part whereof I travelled over on purpoſe to make them: profeſſedly ſearching all places as I paſs'd along, and taking a careful and exact view of *Things* on all hands as they preſented, in order to inform my ſelf of the preſent condition of the Earth, and all Bodies contained in it, as far as either Grotto's, or other Natural Caverns, or Mines, Quarries, Colepits, and the like, let me into it, and diſplayed to ſight the interiour Parts of it; not neglecting, in the mean time, the exteriour or ſurface, and ſuch Productions of it as any where occurred, Plants, Inſects, Sea, River, and Land Shells; and, in a word, whatever either the Vegetable or Animal World afforded.

Nor did I confine theſe Obſervations to Land, or the Terreſtrial Parts of the Globe only, but extended them to the Fluids of it likewiſe, as well thoſe within it, the Water of Mines, of

Grotto's, and other ſuch like Receſſes, as thoſe upon the ſurface of it, the Sea, Rivers, and Springs.

My principal Intention indeed was to get as compleat and ſatisfactory information of the whole Mineral Kingdom as I could poſſibly obtain. To which end, I made ſtrict enquiry wherever I came, and laid out for intelligence of all Places where the Entrails of the Earth were laid open, either by Nature (if I may ſo ſay) or by Art, and humane Induſtry. And whereſoever I had notice of any conſiderable natural Spelunca or Grotto; any digging for Wells of Water, or for Earths, Clays, Marle, Sand, Gravel, Chalk, Cole, Stone, Marble, Ores of Metals, or the like; I forthwith had recourſe thereunto: and taking a juſt account of every obſervable Circumſtance of the Earth, Stone, Metal, or other Matter, from the Surface quite down to the bottom of the Pit, I entered it carefully into a Journal, which I carry'd along with me for that purpoſe. And ſo paſſing on from Place to Place, I *noted* whatever I found memorable in each particular Pit, Quarry, or Mine: and 'tis out of theſe *Notes* that my Obſervations are compiled.

After I had finiſh'd theſe Obſervations, and was returned back to this City; ſuch were the Commotions which had then ſo unhappily invaded *Europe*, that I ſaw I muſt neceſſarily deſiſt here, and ſit down (for the preſent at leaſt) with what I had already done; having little proſpect of an opportunity of carrying on theſe Obſervations any farther, or of going beyond Seas, to conſider the ſtate of the Earth, and of all ſorts of Foſſils, in more diſtant Countries.

But to ſupply, as far as poſſible, that Defect, I made Application to Perſons who had already travelled, and I knew were of ſuch *Integrity*, that they would not impoſe uncertain or falſe Relations upon me: as alſo of ſo much *Curioſity* as to be likely to give me ſome tolerable inſight into the condition of *theſe things* in Foreign Regions. I likewiſe drew up a *Liſt* of *Quæries* upon this Subject; which I diſpatch'd into all parts of the World, far and near, wherever either I my ſelf, or any of my Acquaintance, had any Friend reſident to tranſmit thoſe *Quæries* unto.

The Reſult of this was, that in time I was abundantly aſſured, that the Circumſtances of *theſe Things* in remoter Countries were much the ſame with thoſe of ours *here*: that the Stone, and other terreſtrial Matter, in *France*, *Flanders*, *Holland*, *Spain*, *Italy*, *Germany*, *Denmark*, *Norway*, and *Sweden*, was diſtinguiſhed into *Strata*, or Layers, as it is in *England*: that thoſe *Strata* were divided by parallel Fiſſures: that there were encloſed in the Stone, and all the other denſer kinds of terreſtrial Matter, great numbers of Shells, and other Productions of the Sea, in the ſame manner as in that of this Iſland. To be ſhort, by the ſame means I got ſufficient intelligence that *theſe Things* were found in like manner in *Barbary*, in *Egypt*, in *Guiney*, and other parts of *Africa*; in *Arabia*, *Syria*, *Perſia*, *Malabar*, *China*, and other *Aſiatick* Provinces; in *Jamaica*, *Barbadoes*, *Virginia*; *New-England*, *Braſil*, *Peru*, and other Parts of *America*. But I reſerve the more *particular Relation* hereof to its proper place.

So that though my own Obſervations were confined to *England*, yet by this means I was made acquainted with the ſtate of *theſe Bodies* in other Countries; even in almoſt all parts of the World wherewith the *Engliſh* maintain any Commerce or Correſpondence; and learn'd from all hands, that the ſtate of them *there* was conformable to that of ours *here*, in the main, and as far as I ſhall lay any ſtreſs upon it in my Concluſions; which indeed are not built upon any Niceties, or ſolitary and uncommon Appearances, but on the moſt ſimple and obvious Circumſtances of theſe terreſtrial Bodies.

As to the Certainty and Accurateneſs of my Obſervations, thus much may modeſtly and very truly be ſaid, that I do not offer any one before I had firſt thoroughly and clearly informed my ſelf in all material Circumſtances of it, and had opportunity of obſerving it in more places than one, that I might be ſatisfied there was nothing caſual or contingent in any of thoſe Circumſtances. This will not be thought an over-great exactneſs, or any thing more than was needful, by *thoſe* who have noted how much Philoſophy hath ſuffered by the neglect and overſight of ſome Naturaliſts in this reſpect. A tranſient and perfunctory Examination of things, frequently leads Men into conſiderable Miſtakes, which a more correct and rigorous Scrutiny would have detected and avoided. The truth is, I have been the more ſcrupulous and wary in regard the Inferences drawn from theſe Obſervations are of ſome importance: 'twas but neceſſary that the Foundation ſhould be firm, when a Superſtructure of Bulk and Weight was to be raiſed upon it. And therefore I advance nothing from any Obſervation that was not made with this Caution, and that any Man may not, as well as my ſelf, without any great pains, inform himſelf of the truth of: And as long as the next Cole-pit, or Mine, the next Quarry, or Chalk-pit, will give abundant Atteſtation to what I write, *theſe* are ſo ready and obvious in almoſt all places, that I need not be any where far to ſeek for a Compurgator; and to theſe I may very ſafely appeal.

Concerning the Obſervations themſelves therefore, there cannot well ariſe any doubt but what may be eaſily ſatisfied: And what I propoſe in this Eſſay being founded upon theſe Obſervations,

ons, every Reader will be judge of the truth and probability of it, and whether that which I do ſo propoſe naturally follows from them or not.

I ſhall diſtribute *them* into two general Claſſes or Sections, whereof the *former* will comprehend my Obſervations upon all the Terreſtrial Matter that is naturally *diſpoſed into Layers*, or *Strata*; ſuch as our common Sandſtone, Marble, Cole, Chalk, all ſorts of Earth, Marle, Clay, Sand, Gravel, with ſome others.

Of this various Matter, thus formed into *Strata*, the far greateſt part of the Terreſtrial Globe conſiſts, from its Surface downwards to the greateſt depth we ever dig or mine. And it is upon my Obſervations on *this* that I have grounded all my general Concluſions concerning the Earth; all that relate to its Form; all that relate to the *Univerſal* and *other* Deluges; in a word, all that relate to the ſeveral Viciſſitudes and Alterations that it hath yet undergone. Nay, upon the ſame Obſervations I have alſo founded ſeveral Concluſions touching Metalls, Spar, and other Minerals, which are found lodged either in theſe *Strata*, amongſt the Sand, Chalk, Earth, and the reſt; or in the perpendicular Intervals of the *Strata* of Stone, Marble, or other ſolid Matter.

For upon the *particular* Obſervations on the ſaid Metallick and Mineral Bodies, (which are the Subjects of the *ſecond* Section,) I have not founded any thing but what purely and immediately concerns the Natural Hiſtory of thoſe Bodies.

To proceed therefore to the Account of my Obſervations upon Sand-ſtone. And in *theſe*, though I do not neglect to note the ſeveral Kinds or Varieties of it: Free-ſtone, Ragg-ſtone, Lime-ſtone, and the reſt; the different Hardneſs, or Solidity, of each: as alſo its Colour, Texture, and the peculiar matter which conſtitutes it: yet I confine my ſelf more ſtrictly to conſider the manner how 'tis diſpoſed in the Earth: the *Strata* into which, by means of *horizontal* ‖ and parallel Fiſſures, it is divided: the Order and Number of theſe *Strata*: their ſituation, in reſpect of the Horizon: the

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‖ *I call thoſe Fiſſures, which diſtinguiſh the Stone into Strata,* Horizontal *ones; and thoſe which interſect theſe* Perpendicular: *not ſo much with reſpect to the* preſent *ſite of the Strata, which (as I ſhall ſhew) is altered in many places, as to its* original *ſituation; concerning which, ſee* Part 2. Conſect. 5.

Thickneſs, Depth, and other Circumſtances of each: the Interruptions of the *Strata*, I mean the *perpendicular* Fiſſures, which interſect the horizontal ones: the different Capacity or Largeneſs of theſe perpendicular Intervals; their Diſtances from each other; and the Spar, and other Mineral and Metallick Matter, uſually contained in them.

But, becauſe I ſaw that Deductions of conſiderable import and conſequence might be drawn from them, I have with great Care and Intention obſerved the Condition of ſuch heterogeneous Bodies, which I found immerſed and included in the maſs of this Sandſtone; particularly the Shells of Oyſters, Muſcles, Scallopes, Cockles, Periwinkles, and very many other marine Productions. I have, I ſay, very diligently noted all Circumſtances of theſe Shells: the vaſt Numbers of them; the ſeveral kinds that are thus lodged in the ſubſtance of the Stone: the Order and Manner of their poſition in it; the ſeveral Depths at which they are found; the Matter which they contain in them, and wherewith their Cavities are uſually filled.

These Obſervations about Stone are ſucceeded by others, of like nature, concerning Marble, Cole, and Chalk: their Fiſſures: the Situation of their *Strata*: the Shells, and other heterogeneous Bodies lodged therein.

In the next place, thoſe which concern Marle, Clay, the ſeveral kinds of Earth, Sand, Gravel, and ſome other Foſſils: the Shells and other like Bodies, lodged in their *Strata*: the Poſition of thoſe *Strata*: their Order; their Diſtinctions from each other, by the difference of the Matter of each, and by its different Conſiſtence and Colour; the *Strata* of theſe laxer kinds of Matter being not ordinarily divided from each other by interpoſition of horizontal Fiſſures, as thoſe of Stone, and ſuch other ſolid Matter, conſtantly are.

And laſtly, thoſe which relate to the upper or outmoſt *Stratum* of all: I mean that blackiſh Layer of Earth or Mould which is called by ſome *Garden-Earth*, by others *Under-turf Earth*, wherewith the Terreſtrial Globe is almoſt every where inveſted, unleſs it be diſturbed, or flung off by rains, digging, plowing, or ſome other external force; inſomuch, that whatſoever lies deeper, or underneath, whether Stone, Marble, Chalk, Gravel, or whatever elſe, this *Stratum* is ſtill expanded at top of all; ſerving, as it were, for a common Integument to the reſt: and being (as ſhall be ſhewn in due place) the Seminary or Promptuary that furniſheth forth Matter for the formation and increment of Animal and Vegetable Bodies; and into which all of them ſucceſſively are again finally returned.

The Obſervations being thus diſpatch'd, my next ſtep ſhould have been to have propoſed the Deductions from them; to have determined how theſe Sea-ſhells were brought to Land, and how they became interr'd in the bowels of the Earth, in the manner deſcribed in thoſe Obſervations. But before I could proceed any farther towards *that*, I found my ſelf neceſſarily obliged to take off a difficulty not long ſince ſtarted by ſome learned Men, who ſuſpect that theſe Shells are not real; that they were never bred at Sea; but are all of Terreſtial Original, being meer Stones, though they bear a reſemblance of Shells, and formed, in the places where they are now found, by a kind of Luſus of Nature, in imitation of Shells.

How nearly I am concerned to remove this Obſtacle, before I paſs on any farther to the proſecution of my Deſign, any one may preſently ſee. For to go about to enquire at what time, and by what means theſe Shells were conveyed out of the Sea to dry Land, when a Doubt hath been moved whether they are Shells or not, or ever belonged to the Sea, without firſt clearing this Matter, and putting it quite out of doubt; would be ſenſeleſs and abſurd. In order therefore unto this, I premiſe

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## *A Diſſertation concerning Shells and other marine Bodies, found at Land; Proving that they were originally generated and formed at Sea: that they are the real Spoils of once living Animals: and not Stones, or natural Foſſils, as ſome late Learned Men have thought.*

I Shall be the more brief and ſparing in my Extract of this Diſſertation, in regard that coming on thus in order before the other Parts of this Work, it will it ſelf, of courſe, ſee the Light ſomewhat ſooner than they, any of them will. For which reaſon, I ſhall at preſent only ſay thus much of it in general; that *therein* I firſt fairly lay before the Reader the Arguments that have been urged by theſe Gentlemen to perſwade us that theſe Bodies are mere Mineral Subſtances; and having detected the inſufficiency of them, by evincing from the moſt plain and ſimple Reaſon, how far they are from being concluſive, and how much they fall ſhort of proving what they are alledged for; I then proceed to lay down my own, and offer thoſe Reaſons which have induced me to believe that theſe are the very *Exuviæ* of Animals, and all owing to the Sea.

I would not be thought to inſinuate that the Opinion of theſe Gentlemen carries no ſhew of Truth, nor umbrage of Reaſon of its ſide. 'Tis not to be ſuppoſed, that Perſons of their Learning and Abilities would ever have eſpouſed it, were it not in ſome meaſure plauſible: and had not at leaſt a fair appearance of probability. The very finding theſe Bodies included in Stone, and lodged in the Earth together with Minerals, was alone enough to move a Suſpicion that *theſe* were Minerals too: the finding them even to the very bottom of Quarries and Mines: in the moſt retired and inward *Parts* of the moſt firm and ſolid Rocks: in the deepeſt bowels of the Earth, as well as upon the ſurface of it: upon the tops of even the higheſt Hills and Mountains, as well as in the Valleys and Plains: and this not in this or that Province only, not only in one or two Fields, but almoſt every-

where: in all Countries and Quarters of the Globe, wherever there is any digging for Marble, for Stone, for Chalk, or any other Terreſtrial Matter that is ſo compact as to fence off external Injuries, and ſhield them from Decay and Rottenneſs. *This*, together with their "being lodged in company "of the Belemnites, Selenites, Mar- 1.
"chaſits, Flints, and other like Bo-"dies, which were inconteſtibly na-"tural Foſſils, and, as *they* ſuppoſed, "in the *place of their formation*;" was enough to ſtagger a Spectator, and make him ready to entertain a belief that *theſe were ſo* too. 'Tis a *Phænomenon* ſo ſurprizing and extraordinary, that 'tis not ſtrange that a Man ſhould ſcarcely credit his very Senſes in the caſe: that he ſhould more readily incline to believe that they were Minerals, as the Belemnites, and the others recited, are: or indeed almoſt any thing elſe rather than Sea-ſhells; eſpecially in ſuch Multitudes, and in places ſo unlikely: ſo deep in the Earth, and far from the Sea, as theſe are commonly found.

Nor was this, as indeed they tell 2.
us, the only difficulty theſe worthy

Perſons had to ſurmount; "They "found, together with theſe, certain "Bodies that bore the ſhape and reſem- "blance of Cockles, Muſcles, and other "Shells, which yet were *not really ſuch*; "but conſiſted intirely, ſome of them, "of Sand-ſtone: others of Flint, and "others of Spar: or ſome other kind "of Mineral Matter."

3. Nay, they met with ſome, "That "were in all appearance Shells: that "were of the ſame bigneſs, figure, and "texture, with the common Echini, "Scallops, and Perewinkles; but had "notwithſtanding Flint, Native-Vi- "triol, Spar, Iron-Ore, or other Me- "tallick or Mineral Matter, either ad- "hering firmly in lumps to the out- "ſides of them, or inſinuated into their "ſubſtance, into their pores, and in- "ner parts, ſo as to diſguiſe them very "much, and give them a face and mien "extremely unlike to that of thoſe "Shells which are at this day found at "Sea."

4. They obſerved alſo, that "amongſt "the Shells, that were fair, unaltered, "and free from ſuch Mineral Inſinua- "tions, there were ſome which could "not be match'd by any ſpecies of

"Shell-fiſh now found upon the Sea-"ſhores.

And that on the contrary, "there "were ſeveral Shells found commonly "upon the ſaid Shores, ſuch as the "larger Shells of the *Buccina* of the "*Conchæ Veneris*; of Crabs, Lobſters, "and others, both of the Cruſtaceous "and Teſtaceous kind, which yet we "never met with at Land, or in our "Quarries."

Nay there were ſome other Difficulties which they have urged, and which (though they be of leſſer weight) ſhall all of them be recounted and conſidered more particularly in the Diſſertation it ſelf.

Upon the whole therefore 'tis very plain, that theſe Authors did not eſpouſe *this* Opinion without ſome grounds: without ſome countenance of probability: and that they have charged the *oppoſite* with a large crowd of Difficulties. Yea, ſo far are they from being deſtitute of an handſome Apology, that they very well deſerve the Thanks of the world for what they have done. For although they have not ſucceeded in their Attempts about the Origin of theſe Bodies, yet they have made Diſcoveries in other reſpects concerning *them*, and in *other parts* of Nature likewiſe, of that moment and conſequence, as to have thereby laid a great and laſting Obligation upon the intelligent and diſcerning part of Mankind.

But that they have failed notwithſtanding in this Enterprize, 'tis, I think, not over difficult to prove. And *this* is the Subject of the preſent Diſcourſe. Wherein I hope clearly to 1. make out, that the Sea gave Birth to theſe Bodies: that *they* are ſo far from being formed in the Earth, or in the places where they are now found, that I ſhall evince, † that even the Belemnites, Selenites, Marchaſits, Flints, and other natural Minerals, which are lodged in the Earth, together with theſe Shells, were not formed *there*, but had Being before ever they came thither: and were fully formed and finiſhed before they were repoſed in that manner.

† *Part* 4. *Conſect.* 2.

2. That the above-mentioned Bodies which conſiſt of Stone, of Spar, Flint, and the like, and yet carry a reſemblance of Cockles, Muſcles, and other Shells, were originally formed in the

Cavities of Shells of thoſe kinds which they ſo reſemble; theſe Shells having ſerved as Matrices or *Moulds* to them; the Sand, Sparry and Flinty Matter being then ſoft, or in a ſtate of ſolution, and ſo, ſuſceptible of any form, when it was thus introduced into theſe ſhelly-Moulds: and that it conſolidated, or became hard afterwards*.

3. That for the Metallick and Mineral Matter which ſometimes adheres to the Surfaces of theſe Shells, or is intruded into their Pores, and lodged in the Interſtices of their Fibres, 'tis all manifeſtly *adventitious* †; the mineral Particles being plainly to be diſtinguiſhed from the teſtaceous ones, or the texture and ſubſtance of the Shell, by good Glaſſes, if not by the naked Eye. That though the thing had been ſo that this Accretion had not been thus diſcernible, and conſequently the Alteration of theſe Shells could not have been accounted for, ſo that we had been perfectly in the dark as to the Origin of the Bodies thus altered, and that nothing at all could have been determined concerning *them*; yet this would not have been any the leaſt Impediment or objection againſt that which I in-

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* *Concerning theſe* Conchitæ, Cochlitæ, *&c. ſee Part* 4. *Conſ.* 2. *and Part* 5. *Conſ.* 5.

† *Part* 4. *Conſ.* 2.

I inſiſt upon; there being ſo very few of theſe in compariſon of thoſe which have undergone no ſuch Alteration: There being, I ſay, beſides *theſe*, ſuch vaſt multitudes of Shells contained in Stone, *&c.* which are intire, fair, and abſolutely free from any ſuch mineral Contagion: which are to be match'd by others at this day found upon our Shores, and which do not differ in any reſpect from them: being of the ſame ſize that thoſe are of, and the ſame ſhape preciſely; of the ſame ſubſtance and texture; as conſiſting of the ſame peculiar Matter, and this conſtituted and diſpoſed in the ſame manner, as is that of their reſpective fellow-kinds at Sea: the tendency of the Fibres and *Striæ* the ſame: the compoſition of the *Lamellæ*, conſtituted by theſe Fibres, alike in both: the ſame *Veſtigia* of Tendons (by means whereof the Animal is faſtned and joyned to the Shell) in each: the ſame *Papillæ*: the ſame *Sutures*, and every thing elſe, whether within or without the Shell, in its Cavity or upon its Convexity, in the Subſtance, or upon the Surface of it. Beſides; theſe Foſſil Shells are attended with the ordinary Accidents of the *marine ones*, *ex. gr.* they ſometimes grow to one another, the leſſer Shells being fix'd to the larger: they have *Balani*, *Tubuli vermiculares*, Pearls, Coral, and the like, *ſtill* actually growing upon them. And which is very conſiderable, they are moſt exactly of the ſame ſpecifick Gravity with their fellow-kinds now upon the ſhores. Nay farther, they anſwer all Chymical tryals in like manner as the Sea-ſhells do: their parts when diſſolved have the ſame appearance to view, the ſame ſmell and taſte: they have the ſame *vires* and effects in Medicine, when inwardly adminiſtrated to Animal Bodies: *Aqua fortis*, Oyl of Vitriol, and other like *Menſtrua*, have the very ſame effects upon both. In one word, ſo exactly conformable to the marine ones are theſe Shells, Teeth, and Bones, which are digged up out of the Earth, that though ſeveral Hundreds of them, which I now keep by me, have been nicely and critically examined by very many Learned Men, who are skill'd in all parts of Natural Hiſtory, and who have been particularly curious in, and converſant with, Shells, and other marine Productions, yet never any

Man of them went away diſſatisfied, or doubting whether theſe are really the very *Exuviæ* of Sea-fiſhes or not. Nay, which is much more to my purpoſe, ſome of the moſt eminent of thoſe very Gentlemen who formerly were doubtful in this Matter, and rather inclinable to believe that theſe were natural Minerals, and who had *wrote* in defence of that Opinion, do notwithſtanding upon ſtrict and repeated Inſpection of theſe Bodies in my Collection, and upon farther Enquiry, and procuration of *plain* and *unalter'd* Shells from ſeveral parts of this Iſland, fully aſſent to me herein, and are now convinced that theſe are the ſpoils and remains of Sea-Animals. And, being thus ſatisfied, ſuch is the Ingenuity of theſe worthy Perſons, and ſo great their Affection to Truth, when, where, and by whomſoever manifeſted, that they have perſonally requeſted me to publiſh my Thoughts in order to the fuller clearing of this matter. But to proceed.

4. That although I can *pair*, with Sea-Shells, ſeveral of theſe Foſſil ones that theſe Gentlemen have pronounc'd altogether unlike any thing that the Salt-

Water produceth; yet 'tis indeed very true, that there are found ſome Shells at Land, in Stone, and in Chalk, which cannot probably be match'd by any ſpecies of Shells now appearing upon our Shores. But notwithſtanding this, I cannot but affirm that *theſe*, even the moſt ſtrange and enormous of them, have all the eſſential Notes and Characters of Sea-Shells, and ſhew as near a relation to ſome now extant upon the Shores, as the different Species of *thoſe* themſelves do to one another: that they are of the very ſame ſpecifick Gravity with thoſe to which they are ſo generically allied: and of the ſame Texture and Conſtitution of parts; the ſubſtance of *theſe* being as plainly teſtaceous, as that of *thoſe* is; inſomuch that any Man that compares them, can no more doubt of the reality of the *one* than of the *other*; whence it muſt needs follow, that there were ſuch Shell-fiſh *once in being*; which is enough for my purpoſe; I being no ways concerned to make out that there are of the ſame kinds *ſtill* actually *living* in the Ocean. Though if I *was*, 'twould be no very hard task; it being evident from the Relations of Dyvers, and

Fiſhers for Pearls, that there are many kinds of Shell-fiſh which lye perpetually concealed in the *Deep*, skreen'd from our Eyes by that vaſt world of Water, and which have their continual abode at the bottom of the Ocean, without ever approaching near the Shores, it being as unnatural for *theſe* to deſert this their native ſtation, as 'tis for thoſe that are the inhabitants of the Shores, to quit theirs, and retire into the deep: that for this reaſon *theſe* are called by Naturaliſts ἐμβύθιοι, and *Pelagiæ*, as the others, that reſide nearer to the Shores, are by them called *Littorales*. Now the Shells which we find expoſed upon our Shores, are only thoſe which are caſt up and ſtranded by tides and by ſtorms; and conſequently are all of them *Exuviæ* of thoſe kinds that live near the Shores, and not of thoſe that inhabit the *Main*, or the deeper and remoter parts of the Ocean; it being certain from the Relations alſo of Dyvers, that the Tides and Storms, even the moſt tempeſtuous and turbulent, affect only the ſuperficial parts of the Ocean, the Shallows, and Shores, but never reach the greater Depths, or diſturb the bottom of the *Main: theſe* are as quiet, and free from Commotion in the midſt of ſtorms, as in the greateſt calm; ſo that the Shell-fiſh, which are reſident in theſe places, live and dye there, and are *never* diſlodged or removed by ſtorms, nor caſt upon the Shores, which the *Littorales* uſually are. When therefore I ſhall have proved more at large, that thoſe which we find at Land, that are not matchable with any upon our Shores, are many of them of thoſe very kinds which the forecited Relations particularly aſſure us are found no where but in the deeper parts of the Sea: and that as well thoſe which we can match, as thoſe we cannot, are all Remains of the univerſal Deluge, when the Water of the Ocean, being boiſterouſly turned out upon the Earth, bore along with it, Fiſhes of all ſorts, Shells, and the like moveable Bodies, which it left behind at its return back again to its Chanel, it will not, I preſume, be thought ſtrange, that amongſt the reſt, it left ſome of the *Pelagiæ*, or thoſe kinds of Shells which naturally have their abode at main-ſea, and which therefore are now never flung up upon the Shores:

and it may very reaſonably be concluded, that all theſe *ſtrange* Shells, which we cannot ſo match, are of theſe *Pelagiæ :* that the ſeveral kinds of them are at this day living in the huge boſom of the Ocean : and that there is not any one intire ſpecies of Shell-fiſh, formerly in being, now periſh'd and loſt.

5. That it is alſo very true that there are ſome Shells, ſuch as thoſe of the larger *Buccina*, and *Conchæ Veneris*, of Lobſters, Crabs, and others of the cruſtaceous kind, that are very rarely found at Land; ſo *rarely*, that ſome of theſe Gentlemen have aſſerted that they are *never* found; but *that* I ſhall ſhew to be a miſtake, all the Shells in their whole Liſt having been found in the Earth in one place or other. But that theſe are very *ſeldom* found any where, I moſt readily grant; and this is ſo far from being an Argument againſt what I am going to advance, that 'tis as full and ſubſtantial a Proof of the truth of it as I could poſſibly wiſh. For the Shells in this Liſt are all lighter than Stone, Marble, and the other ordinary Terreſtrial Matter. Now both theſe and all other ſorts of

Shells that are *ſo light*, occur very ſeldom at Land, or in the Earth, in compariſon of the Shells of Cockles, Perewinkles, and the reſt which are more ponderous, ſo as to equal the Stone, and the other Terreſtrial Matter in Gravity. The Reaſon of which will be very plain, when I ſhall have ſhewn * that at the time of the Deluge (when theſe Shells were brought out upon the Earth, and repoſed therein in the manner we now find them) Stone, and all other ſolid Minerals, loſt their ſolidity: and that the ſever'd Particles thereof, together with thoſe of the Earth, Chalk, and the reſt, as alſo Shells, and all other Animal and Vegetable Bodies, were taken up into, and ſuſtained in, the Water: that at length all theſe ſubſided † again promiſcuouſly, and without any other order than that of the different ſpecifick Gravity of the ſeveral Bodies in this confuſed Maſs, thoſe which had the greateſt degree of Gravity ſinking down firſt, and ſo ſetling loweſt; then thoſe Bodies which had a leſſer degree of Gravity fell next, and ſettled ſo as to make a *Stratum* upon the former; and ſo on, in their ſeveral turns, to the

* *Vid. Part* 2. *Conſ.* 2.

† *Vid. Part* 2. *Conſ.* 3.

the lighteſt of all, which ſubſiding laſt, ſettled at the Surface, and covered all the reſt: that this very various Miſcellany of Bodies being determined to ſubſidence in this Order meerly by their different ſpecifick Gravities, all thoſe which had the ſame degree of Gravity ſubſided at the ſame time, fell into, and compoſed, the ſame *Stratum*; ſo that thoſe Shells, and other Bodies, that were of the ſame ſpecifick Gravity with Sand, ſunk down together with it, and ſo became incloſed in the *Strata* of Stone, which that Sand formed or conſtituted: thoſe which were lighter, and of but the ſame ſpecifick Gravity with Chalk (in ſuch places of the Maſs where any Chalk was), fell to the bottom at the ſame time that the Chalky Particles did, and ſo were entombed in the *Strata* of Chalk; and in like manner all the reſt: that accordingly we now find in the Sand-ſtone of all Countries (the ſpecifick Gravity of the ſeveral ſorts whereof is very little different, being generally to water as $2\frac{1}{2}$ or $2\frac{9}{16}$ to 1) only thoſe *Conchæ*, *Pectines*, *Cochleæ*, and other Shells that are nearly of the ſame Gravity, (*viz.* 2 or $2\frac{5}{8}$ to 1) but theſe are ordinarily found encloſed in it in prodigious numbers; whereas of Oyſter-ſhells, (which are in Gravity but as about 2 $\frac{1}{3}$ to 1) of *Echini* (which are but as 2 or 2$\frac{1}{8}$ to 1) or the other lighter kinds of Shells, ſcarce one ever appears therein; but, on the contrary, in Chalk (which is lighter than Stone, being but as about 2 $\frac{1}{10}$ to 1) there are only found *Echini*, and the other lighter ſorts of Shells; it being extreamly unuſual to meet with ſo much as one ſingle Shell of any of all the heavier kinds amongſt Chalk; but for the ſaid *Echini*, and other the lighter ſorts of Shells, they are very numerous and frequent, in all the Chalk-pits of *Kent*, *Surrey*, *Eſſex*, *Hartfordſhire*, *Barkſhire*, *Oxfordſhire*, and all others that I have ſearch'd; being found indifferently in the beds of Chalk from the top quite down to the bottom of the Pit; I having my ſelf commonly obſerved them to the very bottom of all, in Pits that were an hundred foot deep, and in Wells much deeper. To conclude, thoſe Shells, and other Bodies, that were ſtill lighter than *theſe*, and conſequently lighter than Stone, Chalk, and the other common Matter of the Earth, ſuch as the Shells of Lobſters (which are but as 1 $\frac{1}{3}$ to 1) of Crabs, (1 $\frac{1}{4}$ to 1) and the reſt of the Cruſtaneous kind: the Teeth and Bones of the cartilaginous and ſquammoſe Fiſhes, and many other Bodies, would ſubſide laſt of all, and ſo, falling above the reſt, be lodged near, if not upon the Surface; where being continually expoſed to Weather, and other Injuries, they muſt in tract of time needs decay and rot, and at laſt quite vaniſh and diſappear; and 'tis not to me any great wonder, that at this diſtance of four thouſand years, we find ſo very few of them remaining. So that I think I may now ſafely appeal to any ingenuous and impartial Looker on, whether this, *That we find all thoſe kinds of Shells (now extant upon our Shores) which have nearly the ſame Gravity with Stone, and the other ordinary Matter of our Earth, that is ſo tight and compact as to preſerve them, encloſed in great plenty therein, and only thoſe, the reſt which are lighter being ſo very rarely found*, can reaſonably be ſuppoſed to have happened by meer chance, with this Conſtancy and Certainty, and that in ſo many and diſtant Places: as alſo, whether *this* be any

Objection againſt my Hypotheſis; or rather be not the ſtrongeſt acceſſary Confirmation of it that could well be expected, or even deſired.

To this Diſſertation I ſhall ſubjoyn an Appendix, which will conſiſt of ſeveral Sections, touching the Bodies called *Unicornu Foſſile*, *Lapis Judaicus*, *Entrochus*, *Aſteria*, or the Star-ſtone-Columns: with ſome farther Reflections upon the *Bufonites*, *Gloſſopetra*, and *Cornu Ammonis*: proving that theſe, and ſeveral more, which have been (for many Ages) reputed Gemms, and meer Stones, are really nothing elſe but the Teeth, Bones, and other parts of Sea-Animals, and (as the reſt were) left behind by the Univerſal Deluge.

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# PART I.

*An Examination of the Opinions of* former Writers *on this Subject. The* Means *whereby* they *thought theſe Marine Bodies brought out upon the Earth. Of certain* Changes *of Sea and Land, and other Alterations in the Terraqueous Globe, which* they *ſuppoſe to have happened.*

THIS ſo conſiderable a point being thus gained: the Legitimacy or Reality of theſe Marine Bodies vindicated and aſſerted: and my Way ſo far effectually cleared by the foregoing Diſſertation; I now re-aſſume my original Deſign, and paſs on to enquire by what means they were hurried out of the Ocean, the place of their native Abode, to dry Land, and even to Countries very remote from any Seas.

And this is a Queſtion of great Antiquity; and which hath, for many Ages, given no ſmall Fatigue to Learned Men. Nor hath the *preſent* been leſs inquiſitive into this Affair than the *former* Ages were. We have ſeen ſeveral hands employed herein; and many of them very excellent ones too. The great number of the Undertakers: the Worth of ſome of them: and their Zeal to bring the Matter to a Deciſion, are ſure Arguments of the Dignity and Importance of it: and that it is not hitherto decided, is as certain a proof of its difficulty.

Some were of Opinion, that theſe Shells were fetch'd from Sea, by the ancient Inhabitants of thoſe Countries where they are now found; who, after they had uſed the included Fiſhes for Food, flinging forth the Shells, many of them became petrified, as they ſpeak; being thereby preſerved down to our times, and are the ſame which we at this day find in our Fields and Quarries.

Others rather thought that they were only Reliques of ſome former great Inundations of the Sea; which, furiouſly ruſhing forth, and overflowing the adjacent Territories, bore theſe Bodies out upon the Earth along with it: but returning at length more leiſurely and calmly back again, it left them all behind.

Many were of Opinion, that the Sea frequently flitted and changed its place: that ſeveral parts of the Globe which are now dry Land, and habitable, lay heretofore at the bottom of the Sea, and were covered by it: that particularly the very Countries, which preſent us with theſe *Spoils* of it, were anciently in its poſſeſſion; being then an Habitation of Sharks and other Fiſhes: of Oyſters, Cockles, and the like; but the Sea, in tract of time, retreating thence, and betaking it ſelf into new Quarters: gaining as much ground on the oppoſite Coaſts, as it loſt upon thoſe, left theſe Shells there as Marks of its ancient bounds and ſeat.

Amongſt the reſt there were indeed ſome who believed theſe to be Remains of the General Deluge, and ſo many Monuments of that calamitous and fatal Irruption. Theſe laſt aſſuredly were in the right; but the far greater part of them rather aſſerted than proved this: rather deliver'd it as their Opinion, than offered any rational Arguments to induce others to the ſame Belief: And for the reſt, who did offer any, ſo unhappy were they in the Choice, and unſucceſsful in the Management of them, by reaſon of the ſhortneſs of their Obſervations, and their not having duely informed themſelves of the ſtate of theſe Things, that none of the other Partizans appeared with leſs Applauſe: none leſs ſtrenuouſly maintained their ground, than theſe did.

The Truth is, as Matters were ordered amongſt them, no Man could receive much Light or Satisfaction from what was advanced by any of them. They little more than claſhed with one another: each could demoliſh the others Work with eaſe enough, but not a Man of them tolerably defend his own; which was ſure never to outſtand the firſt Aſſault that was made. Yea upon ſo equal Terms did they all ſtand, that no one could well lay claim to a larger ſhare of Truth for his ſide: no one had a fairer pretence of *right*, than the reſt; and it being impoſſible to imagine that all could be in the right; ſome Learned Men began to ſuſpect that none of them were ſo.

Theſe thereupon laid out on all hands for ſome new Expedient to ſolve and put an end to the perplexity; and 'twas this laſt Effort that brought forth the Opinion, that theſe Bodies are not what they ſeem to be; that they are no Shells, but meer Sportings of active Nature in this ſubterraneous Kingdom; and only Semblances or Imitations of Shells; they imagining that this ſhortned the Difficulty, becauſe it ſpared them the trouble of accounting for their Conveyance from Sea; which was what had ſo ſeverely exerciſed all the former; though in reality, this only heightened and enhanſed it, and render'd it ſtill more intricate; as will appear more at large when I ſhall have publiſhed the preliminary Diſſertation, whereof I have already given ſome Account above. And this was the moſt received and prevalent Opinion when I firſt brought my Collection of theſe Things up to *London*.

There have been, beſides theſe recited, ſome other Conjectures propoſed about the removal of theſe Bodies to Land: which I chooſe, rather than trouble the Reader with a detail of them here, to deferr to their proper place, that I may proceed directly onwards in my Deſign. Now the more effectually to ſmooth my way, and that this very great diverſity of Opinions may not be any longer an Amuſement to the World, 'twill be very convenient that I look into the Reaſons and Pretenſions of each, and ſhew upon what ground 'tis that I embrace that of the Deluge, and ſet aſide all the reſt.

Why I adhere to them who ſuppoſe theſe Marine Productions brought out by the Univerſal Deluge, will be beſt learn'd from the ſucceeding part of this Eſſay, which is wholly dedicated to that purpoſe: and whereunto I ſhall prefix, An Hiſtorical Account of the Labours of *Fab. Columna*, *Nic. Steno*, *P. Boccone*, *Jac. Grandius*, Mr. *John Ray*, and other Learned Men, on this Subject: ſhewing what they have already done in it, wherein they failed, and what remains ſtill to be done.

Why I reject all the other Conjectures, falls under our preſent Conſideration; and to make as ſhort of the Matter as poſſible, 'tis becauſe they will none of them abide the Teſt: becauſe they have not due warrant from Obſervation, but are clearly repugnant thereunto: in a word, becauſe the preſent Circumſtances of theſe Marine Bodies do not ſquare with thoſe Opinions, but exhibit *Phænomena* that thwart them, and that give plain Indications that they could never have been put into the Condition we now find them by any ſuch ſhort and partial Agents as thoſe they propoſe.

Now in regard that the ſaid Circumſtances are impartially related in my Obſervations, we need only have recourſe to them to put an end to this Buſineſs. For, as Mathematicians ſay of a ſtreight Line, that 'tis as well an Index of its own Rectitude, as of the Obliquity of a crooked one; ſo *theſe* may ſerve indifferently to detect the erroneous ways, and to point forth the *true*; and it is from theſe Obſervations: from the Number, Order, Variety, Situation, Depth, Diſtance from the Sea, and other Accidents of theſe Bodies, that I ſhall ſhew

That *they* were not brought from Sea to the Parts where they are now found, by Men, the ancient Inhabitants of thoſe Parts, as ſome Authors have been of Opinion; they preſuming that theſe Shells were at firſt only flung out upon the Surface of the Earth; and that thoſe which we now find buried in it, were, in tract of time, covered, either by that Terreſtrial Matter which falls down along with rain, or by the Earth which is waſh'd from off the Hills by Land floods. 1.

That *they* were not carry'd together with the Water, which ſome ſuppoſe to paſs continually from the bottom of the Sea, to the Heads of Springs and Rivers, through certain ſubterranean Conduits or Chanels, untill they were by ſome Glut, Stop, or other means arreſted in their Paſſage, and ſo detained in the Bowels of the Earth; as others have rather inclined to believe. 2.

That *they* were not born forth of the Sea, and laid upon the Land by particular Inundations; ſuch as were the *Ogygean*, the *Deucalionian*, and others of freſher date: ſuch as are thoſe 3.

thoſe which uſually attend Earthquakes: or thoſe which are ſometimes occaſioned by very high Tides, by impetuous Winds, and the like; as other Writers have thought.

4. That *they* were not left behind at the *beginning* of the World, when the Sea overſpread the whole Globe, till its Retreat into its aſſigned Chanel, and that *the Waters* were *gathered together unto one place*, the third day from the Commencement of the Creation; which others believed.

5. That *they* were not left by the Seas being conſtrained to withdraw from off certain tracts of Land, which lay till then at the bottom of it, but being raiſed to an higher pitch, ſo as to ſurmount the Level of the Seas ſurface, they, by that means, became Iſlands and habitable: the ſaid tracts being thus elevated by Earthquakes, or the like ſubterraneous Exploſions; in ſuch manner as *Rhodes*, *Thera*, *Theraſia*, and many other Iſlands were ſuppoſed to have been raiſed; which is the Conjecture of others.

6. That *they* were not left by the Seas changing its place, receding from the Parts it anciently poſſeſt, and betaking it ſelf to new Quarters: *this change* being occaſion'd by ſome accidental Emotion or Tranſpoſition of the common Center of Gravity in the Terraqueous Globe; and thereupon the Fluids of it, the Sea, and the reſt, immediately ſhifting likewiſe, as being the more eaſily moveable parts of the Maſs, and coming to another *Æquilibrium*; that they might thereby the better accommodate themſelves to their new Center. As others.

7. That *they* were not left upon the Seas being protruded forwards, and conſtrained to fall off from certain Coaſts, which it formerly poſſeſſed, by the Mud or Earth which is diſcharged into it by Rivers; the ſaid Mud being repoſed along the Shores near the *Oſtia* of thoſe Rivers, and by that means making continual Additions to the Land, thereby excluding the Sea, daily invading and gaining upon it, and preſerving theſe Shells as Trophies and Signs of its new Acqueſts and Encroachments; which *others* have imagined: they concluding that the Iſlands *Echinades*, the Lower *Egypt*, *Theſſaly*, and many other Countries, were thus raiſed out of the Mud brought down

by *Achelous*, the *Nile*, *Peneus*, and other Rivers.

8. Laſtly. That *they* were not left by the Seas continual flitting and ſhifting its Chanel: this Progreſſion being occaſioned by the Seas wearing and gaining upon one Shore, and flinging up Mud, and, together with it, theſe Shells, upon the other, or oppoſite Coaſts, thereby making perpetual Additions unto them; which is the Opinion of other Authors.

Theſe Propoſitions (which are no other than ſo many Conſectaries drawn from the Obſervations) are, we ſee, all *Negative*; as being directed againſt the Miſtakes of ſome who have formerly engaged in this reſearch. The ways they have taken to account for the Conveyance of theſe Marine Bodies to Land, are very many, as well as different from each other. For ſo eager and ſollicitous hath the inquiſitive and better part of Mankind been to bring this Matter to a fair iſſue and determination, that no Stone hath been left unturned, no way, whereby theſe things could ever poſſibly have been brought forth of the Sea, but one or other of them hath pitch'd upon on it. So that by this Refutation of all theſe, I might prove my own (which is the only one remaining) by Induction; but this kind of proof is not needful, where more cogent and *poſitive* Arguments are not wanting.

And thus much of this Part I get over by the ſole guidance of my Senſes. A View of the preſent ſtate of theſe Bodies alone convinced me ſufficiently that the means, propoſed by theſe Authors, were not the true ones: that they were both levelled wide, and fell all ſhort of the Mark. Now though this was enough for my preſent purpoſe; and when I had evinced that, although ſuch Alterations, as thoſe which theſe Gentlemen ſuppoſe: Tranſitions, and Migrations of the Center of Gravity: Elevations of new Iſlands: whole Countries gained from the Sea: and other like Changes had *actually* happened, yet theſe Shells could never poſſibly have been repoſed thereby in the manner we now find them: I ſay, when I had proved this, I was not immediately concerned to enquire whether ſuch Alterations had really ever happened or not; yet partly for a fuller and more effectual Diſproof of the recited Opinions: and partly becauſe I am more eſpecially obliged by my *general* deſign to look into all Pretences of Changes in the Globe we inhabit; and I ſaw very well, that ſcarce any, of all theſe alledged, had the leaſt countenance either from the preſent face of the Earth, or any credible and authentick Records of the ancient ſtate of it, I reſolved to purſue this Matter ſomewhat farther, and to ſhew that, although there do indeed happen ſome Alterations in the Globe, yet they are very ſlight and almoſt imperceptible, * and ſuch as tend rather to the benefit and conſervation of the Earth and its Productions, than to the diſorder and deſtruction both of the one and the other, as all theſe ſuppoſititious ones moſt manifeſtly would do, were there really any ſuch; but from clear and inconteſtible Monuments of Antiquity: from Hiſtory and Geography: and from attentive Conſideration of the preſent ſtate of thoſe Countries where theſe Changes were ſuppoſed to have been wrought, I prove that they are imaginary and groundleſs, and that ſuch in earneſt never happened; but that the bounds of Sea and Land

* *Part* 5. *Conſ.* 1. &c.

Land have been more fix'd and permanent: and in ſhort, that the terraqueous Globe is to this day nearly in the ſame condition that the Univerſal Deluge left it: being alſo like to continue ſo till the time of its final ruin and diſſolution, preſerved to the ſame end for which 'twas firſt formed, and by the ſame Power which hath ſecured it hitherto. But, with reſpect to my preſent Deſign, I more particularly make out,

That although Rain-water be indeed (as theſe Writers ſuppoſe) very plentifully ſaturated with terreſtrial Matter, and (as I ſhall make appear) that peculiar Matter out of which the Bodies of Vegetables, and conſequently of Animals, are formed, nouriſhed, and augmented, Water being the common Vehicle and Diſtributer of it to the Parts of thoſe Bodies, and all Water (eſpecially that of Rain) being, more or leſs, ſtored with this, it being light in compariſon of the common Mineral earthy Matter, and therefore eaſily aſſumed into Water, and moved along with it; yet that this Matter being all originally deriv'd from the ſurface of the Earth, either by the Vapour that continually iſſues out, and aſcends from all parts of it, † or waſh'd off by Land-floods, and conveyed into Rivers and the Sea, and thence elevated up, together with the Vapour, which, as the former, conſtitutes the Rain that falls: I ſay, it being thus originally all rais'd from the Earth, when reſtored back again thereunto, 'tis but where it was before, and does not enlarge the Dimenſions of the Globe, or augment the ſurface of the Earth, and only lye idly and unſerviceably there, but part of it is introduced into the Plants which grow thereon, for their Nutrition and Increment, and the reſt, which is ſuperfluous, either remounts again, with the aſcending Vapour, as before, or is waſh'd down into Rivers, and tranſmitted into the Sea, and does not make any ſenſible Addition to the Earth, as ſome have believed.

† *Part* 3. *Sect.* 1. *Conſ.* 8.

That the terreſtrial Matter, which is thus carried by Rivers down into the Sea, is ſuſtained therein, partly by the greater Craſſitude and Gravity of the Sea-water, and partly by its conſtant Agitation, occaſioned by the Tides, and by its other Motions, and is not permitted to ſink to the bottom; or, if any of it do, 'tis raiſed up again by the next Storm, and being ſupported in the Maſs of Water, together with the reſt, 'tis by degrees exhaled, mounted up with the Rain that riſes thence, and returned back again to the Earth in fruitful Showers. That by this perpetual Circulation a vaſt many things in the Syſtem of Nature are tranſacted: and two main Intentions of Providence conſtantly promoted; the *one* a Diſpenſation of Water promiſcuouſly and indifferently to all parts of the Earth; this being the immediate Agent that both bears the conſtituent Matter to all formed Bodies, and, when brought to them, inſinuates it in, and diſtributes it unto the ſeveral parts of thoſe Bodies, for their Preſervation and Growth: *the other,* the keeping a juſt *Æquilibrium* (if I may ſo ſay) betwixt the Sea and Land; the Water, that was raiſed out of the Sea, for a Vehicle to this Matter, being by this means refunded back again into it: and the Matter it ſelf reſtored to its original Fund and Promptuary, the Earth; whereby each is reſtrained, and kept to due Bounds; ſo that the Sea may not encroach upon the Earth, nor the Earth gain ground of the Sea. That there never were any Iſlands, or other conſiderable parcels of Land, amaſſed or heap'd up: nor any enlargement, or addition of Earth made to the Continent, by the Mud that is carried down into the Sea by Rivers. That although the Ancients were almoſt unanimouſly of Opinion that thoſe Parts, where *Egypt* now is, were formerly Sea: and that a very conſiderable portion of that Country was *recent*, and formed out of the Mud diſcharged into the neighbouring Sea by the *Nile*; that yet this tract of Land had no ſuch *Riſe*, but is as old, and of as long a ſtanding, as *any* upon all the whole Continent of *Africa*: and hath been in much the ſame Natural Condition, that it is at this day, ever ſince the time of the Deluge; its Shores being neither advanced one jot further into the Sea for this three or four thouſand Years, nor its Surface raiſed by additional Mud depoſed upon it by the yearly Inundations of the *Nile*. That neither the *Palus Mæotis*, nor the *Euxine*, nor any other Seas fill up, or by degrees grow ſhallower. That *Salmydeſſus*, *Themiſcyra*,

*cyra*, *Sidene*, and the adjacent Countries, upon the Coaſts of the *Euxine* Sea, were not formed out of the Mud brought down by the *Iſter*, *Thermodon*, *Iris*, and the other Rivers which diſcharge themſelves into that Sea. That *Theſſaly* was not raiſed out of the Mud born down by the River *Peneus*: the Iſlands *Echinades*, or *Curzolari*, out of that brought by the River *Achelous*: *Cilicia*, by the River *Pyramus*: *Myſia*, *Lydia*, *Ionia*, and other Countries of *Anatolia*, by the *Caicus*, *Hermus*, *Cayſter*, and the other Rivers which paſs through them. To be ſhort, That no Iſland or Country in the whole World was ever raiſed by this means, notwithſtanding that very many Authors, and ſome of conſiderable note, have believed that all the abovementioned Countries were ſo raiſed; nay, to ſo ſtrange a height of Extravagance do ſome, otherwiſe Learned and Curious, Perſons run, when they indulge Fancy too far, and rely wholly upon Probabilities and Conjectures, there is hardly any one ſingle Iſland or Country all round the Globe, that one Writer or other hath not thought to have been formed after this manner, or at leaſt, ſome very large part of it.

That there is no authentick Inſtance of any conſiderable tract of Land that was thrown up from the bottom of the Sea, by an Earthquake, or other ſubterranean Exploſion, ſo as to become an Iſland, and be render'd habitable. That *Rhodus*, *Thera*, *Theraſia*, and ſeveral other Iſlands, which were ſuppoſed by the Ancients, and, upon their Authority, by later Authors, to have been thus raiſed, had really no ſuch Original, but have ſtood out above Water as long as the reſt of their Fellow Iſlands, and ſtand now juſt as the Univerſal Deluge left them.

That as to that affection of Bodies which is called their *Gravity*, it clearly ſurpaſſes all the Powers of meer Nature, and all the Mechaniſm of Matter. That as any one Body, or part of Matter, cannot be the Cauſe of its own Gravity: ſo no more can it ever poſſibly be the Cauſe of the Gravity of another Body, or part of Matter. That neither the Earth's diurnal Revolution upon its Axis: nor any magnetick Effluvia of the Earth: nor the Air, or Atmoſphere which environs the Earth: nor the *Æther*, or *Materia ſubtilis* of the *Carteſians*, in what manner ſoever moved or agitated: (all which have been propoſed by ſeveral Learned Men as the Cauſes of Gravity) nor any other Fluid or Matter whatever, can of it ſelf produce ſuch an Effect as is that of the Gravity of Bodies. That it does not proceed from the Efficiency of any ſuch contingent and unſtable Agents, but ſtands on a Baſis more firm and ſtedfaſt, being intirely owing to the direct Concourſe of the Power of the Author of Nature, immediately in his hand, and the main Engine whereby this ſtupendous Fabrick of the Univerſe is managed and ſupported: the prime Hinge whereon the whole frame of Nature moves; and is principally concerned, if not the ſole Efficient in the moſt remarkable *Phænomena* of the Natural World; which, ſhould Gravity once ceaſe, or be withdrawn, would inſtantly ſhiver into Millions of Atoms, and relapſe into its primitive Confuſion. That the common Center of Gravity in the terraqueous Globe is ſteady, immovable, and not liable to any accidental Tranſpoſition, nor hath it ever ſhifted or changed its Station. And that there is no declination of Latitude: nor variation of the Elevation of the Pole; notwithſtanding what ſome Learned Men have aſſerted.

What concerns the raiſing of new Mountains: Deterrations, or the Devolution of Earth down upon the Valleys, from the Hills and higher Grounds: and Iſlands torn off from the main Continent by Earthquakes, or by the furious and impetuous inſults of the Sea; theſe, I ſay, will fall more properly under our Conſideration on another Occaſion *. And for the Mutations of leſſer moment, which ſome have fancied to have happened within this Interval, I mean, for the laſt four thouſand Years ſince the Deluge, I chuſe rarher to paſs them over at preſent, than to crowd and encumber this ſhort Tract with the account of them.

I muſt needs freely own, that when I firſt directed my Thoughts this way, 'twas matter of real Admiration to me, to find that a Belief of ſo many, and ſuch great Alterations in the Earth, had gained ſo large footing, and made good its ground ſo many Ages, in the World; there being not the leaſt ſigns nor footſteps of any ſuch thing upon the

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* *Part* 2. and *Part* 5.

the face of the whole Earth: no tolerable Foundation for ſuch a Belief either in Nature or Hiſtory. But I ſoon ſaw very well, that the Moderns generally entertained it meerly upon the Credit and Tradition of the Ancients, and *that* without due Examination, or Enquiry into the Truth and Probability of it; and 'twas not long e're I diſcovered what it was that ſo generally miſled the Ancients into theſe Miſtakes. But of that more by and by.

Thoſe ancient Pagan Writers were indeed very much excuſable as to this matter. Philoſophy was then again in its Infancy: there remaining but few marks of the old *Tradition*, and thoſe much obliterated and defaced by Time; ſo that *they* had only dark and faint Idea's, narrow and ſcanty Conceptions, of Providence: and were ignorant of its Intentions, and of the *methods* of its Conduct in the Government and Preſervation of the Natural World. They wanted a longer Experience of *theſe things*: a larger ſtock of Obſervations, and Records of the ſtate of the Earth before their times; having, as things then ſtood, nothing to aſſiſt them in their Enquiries beſides their own Gueſſes and Fancy. For their Progenitors, and thoſe who had lived in the earlier Ages, were almoſt entirely taken up with Buſineſs of another kind. That fatal Calamity, the Deluge, had wrought ſuch a Change, * that *they* beheld every where a new face of things: and the Earth did not *then* teem forth its Encreaſe, as *formerly*, of its own accord, but required Culture, and the Aſſiſtance of their Hands, much more than before it did. The proviſion of Bread for Food: Clothing to ward off the Injury and Inclemency of the Air: and other like Employs for the Comfort and Support of Life, being of indiſpenſible neceſſity, were to be firſt look'd after; and theſe Employs, being then for the moſt part *new* to them, and ſuch as they were unskill'd in, were alone enough to take up the greateſt part of their time. The methods they uſed of Agriculture, and other Arts of like importance, were ſo aukward and tedious, as to afford them little leiſure for *Works of the Brain*, for Hiſtory, or Contemplations of that nature. And till better Experience had led their Poſterity to the Improvements of Arts:

* *Part* 2.

till the Plow, and other uſeful Inſtruments, were found out: and they had learn'd more compendious and expeditious ways of diſpatching thoſe Affairs, whereby they ſhortned their Labours, and ſo gained time, there was no *ſhew* of *Learning*, or Matters of Speculation among them; and we hear little or nothing of *Writing*, nay 'twas a very conſiderable time before *Letters* themſelves were found out. I know very well, there are ſome who talk of Letters before the Deluge; but that is a matter of meer Conjecture, and I think nothing can be peremptorily determined either the one way or the other; though I ſhall ſhew, that 'tis highly probable they had none. Be *that* how it will, I ſhall plainly make out, that the Ages which next ſucceeded the Deluge *had none*; ſo far from it, that they knew nothing at all of them; and the firſt Writing they uſed was only the ſimple Pictures, and Gravings of the things they would repreſent, Beaſts, Birds, and the like; which way of Expreſſion was afterwards called Hieroglyphick. But *this* fell into diſuſe, when Letters were afterwards diſcovered; they being, in all reſpects, a-far more excellent and noble Invention. We ſee therefore that there were ſeveral Reaſons why thoſe early Ages could not tranſmit Accounts of the ſtate of the Earth and of theſe Marine Bodies, in their times, down to the ſucceeding Generations. So that theſe having little more to truſt to than their own Imagination, and no ſurer a Guide in their Reaſonings about *theſe things* than bare Conjecture, 'twas no wonder that they fell into groſs and palpable Miſtakes concerning them.

Nor much more wonder is it that an *Epicurus*: one who could ever eſpouſe a Notion ſo enormouſly abſurd and ſenſeleſs, as that the World was framed by Chance: that this vaſt, regular, and moſt ſtupendous Pile was owing to no higher a Principle than a fortuitous Congreſs of Atoms: and that either there was no God at all, or, which is much the ſame thing, that he was an impotent and lazy *Being*, and wholly without concern for the Affairs of this lower World: I ſay, 'tis in no wiſe ſtrange that ſuch a one ſhould believe, as he did, that things were blindly ſhuffled and hurled about in the World: that the Elements were at conſtant Strife and War with each other: that in ſome places, the Sea invaded the Land: in others, the Land got ground of the Sea: that all Nature was in an Hurry and Tumult: and that as the World was firſt made, ſo ſhould it be again diſſolved and deſtroyed, by Chance: that it had already made large Advances that way, being infirm and worn with Age, ſhattered and crazy, and would in time dwindle and fall back again into its original Chaos.

Did Gravity, the Inclination of Bodies towards the ſame common Center, to which Inclination they owe their reſpective order, and ſite in regard of each other, very many of their Motions and Actions, and in a great meaſure, their preſent Conſtitution: did this, I ſay, happen from ſo contingent, precarious, and inconſtant Cauſes as many have believed: or did it ſtand upon ſo ticklifh and tottering a Foundation as ſome Mens fancy hath placed it, 'twould be no wonder ſhould it frequently vary: its Center ſwerve and ſhift, upon every turn: and that there ſhould enſue thereupon, not only ſuch Motions and Alterations of the

Bounds of the Sea as they imagine, but likewiſe many other, and not leſs pernicious, Perturbations of the courſe of *even univerſal* Nature.

Or was the Univerſe left to its *own* Conduct and Management: the whole Maſs of created Matter to its *proper* Diſpoſition and Tendency: were there no reſtraint of Bounds to the Earth, nor Curb to the fury of the Ocean: was there not *One* who had *ſet bars and doors to it, and ſaid hitherto ſhalt thou come, but no farther, and here ſhall thy proud Waves be ſtaid*; then indeed might we well expect ſuch Viciſſitudes and Confuſions of things: ſuch Juſtlings and Claſhings in Nature: ſuch Depredations, and Changes of Sea and Land.

But if the ſame mighty Power, which in the beginning produced this vaſt Syſtem of Bodies out of Nothing, and diſpoſed and ranged them into the moſt excellent and beautiful order we now behold: which at firſt framed an Earth of a Conſtitution ſutable to the innocent ſtate of its primitive Inhabitants: and afterwards when Man had degenerated, and quitted that Innocence, altered that Conſtitution of the

Earth, by means of the Deluge *, and reduced it to the Condition 'tis now in, thereby adapting it more nearly to the preſent Exigencies of things, to the laps'd and frail ſtate of humane Nature? If that ſame Power be yet at the Helm: if it preſide in the Government of the Natural World: and hath ſtill the ſame peculiar Care of Mankind, and, for their ſake, of the Earth, as heretofore, (all which ſhall be evidently made out:) then may we very reaſonably conclude 'twill alſo continue to preſerve this Earth, to be a convenient Habitation for the future Races of Mankind, and to furniſh forth all things neceſſary for their uſe, Animals, Vegetables, and Minerals, as long as Mankind it ſelf ſhall endure; that is, till the Deſign and Reaſon of its Preſervation ſhall ceaſe; and till then, ſo ſteady are the Purpoſes of Almighty Wiſdom, ſo firm eſtabliſh'd, and conſtant the Laws, whereby it ſupports and rules the Univerſe; the Earth, Sea, and all natural things will continue in the ſtate wherein they now are, without the leaſt Seneſcence or Decay, without jarring, diſorder, or invaſion of one another, without in-

* *Part* 2. *Conſ.* 2. &c.

verſion or variation of the ordinary Periods, Revolutions, and Succeſſions of things: and we have the higheſt ſecurity imaginable, that *While the Earth remaineth, Seed-time and Harveſt, and Cold and Heat, and Summer and Winter, and Day and Night ſhall not ceaſe.*

And whatever may be urged in behalf of the *Ancients*, I cannot well ſee, I confeſs, what can be ſaid for the *later Authors*, who have embrac'd the ſame Tenets, more than that theſe Learned Men took up thoſe Tenets *on truſt*, their over-great deference to the Dictates of Antiquity betraying them into a perſuaſion of ſuch Changes in the Earth. I have given my Reaſons above why I cannot think the Ancients competent Judges in this Caſe. We have, at this time of day, better and more certain means of Information than *they* had; and therefore it were to have been wiſh'd, that theſe Gentlemen had not thus obſequiouſly followed *them*, but gone another way to work. It would certainly have been much better, had they taken the pains to have look'd a little into *Matter of Fact*: had they conſulted Hiſtory and Geography, in order duely to acquaint themſelves with the *paſt* and *preſent* ſtate of the terraqueous Globe; and not to have paſs'd Sentence till they had firſt compared the moſt ancient Deſcriptions of Countries with the Countries themſelves as *now* they ſtand. Nay, had they but read and attended to the Accounts which the very Authors, from whom they borrow theſe Opinions, have left us, they might have diſcovered, even from them, the Errors and Overſights of their Authors: and have learn'd, that the Face of Sea and Land is the very ſame at this day that it was when thoſe Accounts were compiled: and that the Globe hath not ſuſtained any conſiderable Alterations, either in the *whole*, or any of its *Parts*, in all this time.

Thoſe who can content themſelves with a Superficial View of Things: who are ſatisfied with contemplating them in groſs: and can acquieſce in a general, and leſs nice Examination of them: whoſe Thoughts are narrow and bounded: and their Proſpects of Nature ſcanty, and by piecemeal, muſt needs make very ſhort and defective Judgments, and, oftentimes very erroneous, and wide of truth. Some fanciful Men have expected nothing but Confuſion and Ruin from thoſe very means whereby both *that* and *this* is moſt effectually prevented and avoided. *One* imagines that the terreſtrial Matter, which is ſhowered down along with Rain, enlarges the Bulk of the Earth, and that it will in time bury, and lay all things under ground. Another, on the contrary, fancies that the Earth will ere long all be waſh'd away by Rains, and borne down into the Sea by Rivers; and, its Chanel being thereby quite filled up, the Waters of the Ocean turned forth to overwhelm the dry Land. Whereas by this Diſtribution of Matter, continual Proviſion is every where made for the ſupply of Bodies: the juſt ſtate of Sea and Land preſerved, and the Bounds of each ſecured; quite contrary to the prepoſterous Reaſonings of thoſe Men, who expected ſo different a Reſult of theſe things. And ſhould this Circulation (from which they dreaded thoſe diſmal Conſequences) once ceaſe, the Formation of Bodies would be immediately at an end: and Nature at a perfect ſtand. But I am aware that I tranſgreſs: and that this is a Prolixity not allowable in a Treatiſe of this nature; wherefore I ſhall conclude, after I have performed my Promiſe of diſcovering what it was which led the ancient Hiſtorians, Geographers, and others, ſo generally into a belief of theſe frequent Changes betwixt Sea and Land; and 'twas this.

They obſerved, almoſt wherever they caſt their eyes, vaſt multitudes of Sea-ſhells, at Land, in their Fields, and even at very great diſtance from any Sea. This, *Eratoſthenes*, *Herodotus*, *Xanthus Lydus*, *Strabo*, *Pauſanias*, *Pomponius Mela*, *Theophraſtus*, *Strato* the Philoſopher, *Plutarch*, and others of them aſſure us. They found them upon the Hills, as well as in the Valleys and Plains: they obſerved that they were immerſed in the Maſs of the Stone of their Rocks, Quarries, and Mines, in the ſame manner as they are at this day found in all known Parts of the World.

Nay in thoſe Elder Times, and which were ſo much nearer to the Deluge than ours are, they found theſe Marine Bodies more frequently, and in much greater plenty than we now do; and moſt, if not all of them, freſh, entire, and firm. The whole cruſtaceous kind, and the lighter ones of the teſtaceous, which together would be a vaſt number, ſubſiding laſt, fell upon the Surface of the Earth; * whilſt the heavier, which ſettled down before, were entombed in the bowels of it. *Thoſe* therefore muſt then lye every-where ſtrewed upon the ground; whereas now very few, if any, of them appear; † the Shells which we find at preſent upon the face of the Earth being principally of the heavier ſorts, which were at firſt lodged within it, and ſince diſcloſed and turned out, by what means we ſhall ſee hereafter ||. And indeed, 'tis not conceivable how the generality of them could endure ſo many Hundreds of Years as have ſince paſt: how they could lye ſo long expoſed to the Air, Weather, and other Injuries, without vaſt numbers of them, and eſpecially the finer and tenderer Species, being, long e're this, periſh'd and rotten, ſome of them quite diſſolved and vaniſh'd, and the reſt ſo damaged, many of them, and altered by time, as not to appear the things they then were, and ſo create a doubt amongſt ſome of *us* whether they are really Shells or not. This

* *Pag.* 29, &c. *ſupra*, and *Part* 2. *Conſ.* 3.

† *nſ. pag.* . and *rt* 2. *nſ.* 3.

|| *Part* 5. *Conſ.* 4.

This was a Scruple that never entered into *their* Heads. The Shells, being then fair, ſound, and free from decay, were ſo exactly like thoſe they ſaw lying upon their Shores, that they never made any queſtion but that they were the *Exuviæ* of Shell-fiſh, and that they once belonged all to the Sea. But the Difficulty was how they came thither, and by what means they could ever arrive to places oftentimes ſo remote from the Ocean.

The Ages that went before knew well enough how theſe Marine Bodies were brought thither. But ſuch were the Anxieties and Diſtreſſes of the then again infant World: ſo inceſſant their Occupations about Proviſion for Food, Rayment, and the like, that (even after Letters were diſcovered) there was little leiſure to commit any thing to Writing; and, for want *thereof*, the memory of this extraordinary Accident was in great meaſure worn out and loſt. 'Tis true there was a general and loud Rumour amongſt them of a mighty Deluge of Water that had drowned all Mankind except only a very few Perſons. But there had alſo happened very terrible Inundations of later date, and which were nearer to the Times when theſe Authors lived. Such was that which overflowed *Attica* in the days of *Ogyges*: and that which drowned *Theſſaly* in *Deucalion's* time. Theſe made cruel Havock and Devaſtation amongſt them: their own native Country, *Greece*, was the Theatre whereon theſe Tragedies were acted: and their Progenitors had ſeen and felt their Fury. And theſe happening nearer home, and their Effects being freſh, and in all Mens mouths, they made ſo ſenſible and laſting Impreſſions upon their Minds, that the old great Deluge was eclipſed by that means, its Tradition mightily obſcured, and the Circumſtances of it ſo interwoven and confounded with thoſe of theſe later Deluges, that 'twas e'en dwindled into nothing, and almoſt buried in the Relations of thoſe Inundations.

In their Enquiries therefore into this Matter, ſcarcely a Man of them thought, or ſo much as dream'd, of the Univerſal Deluge. They concluded indeed unanimouſly, that the Sea had been there, wherever they met with any of theſe Shells, and that it had left them behind. And ſo far they were in the right: this was an Inference rational and natural enough. But when they began to reaſon about the means how the Sea got thither, and a way back again, there they were perfectly in the dark; and, both Tradition and Philoſophy failing them, they had recourſe to Shifts, and to the beſt Conjectures they could think of; concluding that it was either forced forth, as in particular Inundations, ſuch as thoſe lately mentioned: or that thoſe *Parts*, where they found the Shells, had been formerly in the Poſſeſſion of the Sea, and the place of its natural Reſidence, which it had ſince quitted and deſerted.

Upon this they began to ſeek out by what means, moſt probably, the Sea might have been diſpoſſeſt of thoſe Parts, and conſtrained to move into other Quarters. And if 'twas an Iſland where they found the Shells, they ſtraitways concluded that the whole Iſland lay originally at the bottom of the Sea: and that 'twas either hoiſted up by ſome Vapour from beneath: or that the Water of the Sea, which formerly cover'd it, was in time exhaled, and dryed up by the Sun, the Land thereby laid bare, and theſe Shells brought to light. But if 'twas in any part of the Continent where they found the Shells, they concluded that the Sea had been extruded and driven off by the Mud that was continually brought down by the Rivers of thoſe parts.

That I may not be over-tedious here, I will only add, that I ſhall clearly ſhew, from plain Paſſages of their own Writings yet extant, that 'twas meerly the finding theſe Sea-ſhells at Land that occaſioned this Stir, and raiſed all this Duſt amongſt the Ancients; and upon which principally they grounded their Belief of the Viciſſitudes and Changes of Sea and Land, wherewith their Writings are ſo filled. But how little reaſon they had for it: and how far thoſe have been over-ſeen who have followed them herein, hath been intimated already, and will appear farther from the following part of this Eſſay, to the Account of which I now haſten.

# PART II.

## *Concerning the* Univerſal Deluge. *That theſe Marine Bodies were* then *left at Land. The* Effects *it had upon the* Earth.

THE Conſectaries of the former part of this Diſcourſe are all negative; *that* being only introductory, and ſerving but to clear the way to this ſecond part: to free the Enquiry from the Perplexities that ſome Undertakers have encumber'd it withall: and to ſet aſide the falſe Lights they uſed in queſt of the Agent which tranſpoſed theſe Sea-ſhells to Land.

Having therefore diſcharged my hands of that Task, and, from Obſervation of the preſent ſtate of the Earth, and of the ſite and condition of the Marine Bodies which are lodged within and upon it, ſhewn that they could not poſſibly be repoſed in that manner by particular Inundations: by the Seas receding and ſhifting from place to place: nor by any of the other means there propoſed: I paſs next on to ſearch out the true means: and to diſcover the Agent that did actually bring them forth, and diſpoſed them into the Method and Order wherein we now find them. To which purpoſe I have recourſe again to the Obſervations; for by their Aſſiſtance this Matter may be rightly and fully adjuſted. So that I ſhall only proceed, as hitherto, to make Inferences from them; which Inferences, in this Part are all *affirmative!* Of theſe, the firſt is,

I. That theſe Marine Bodies were born forth * of the Sea by the Univerſal Deluge: and that, upon the return of the Water back again from off the Earth, they were left behind at Land.

* *Confer. Part* 3. *Sect.* 2. *Conſ.* 2, 3.

This is a Propoſition of ſome weight and conſequence; upon which Account I ſhall be ſomewhat prolix and particular in the Eſtabliſhment of it: careful and exact in conferring every Circumſtance of theſe Marine Bodies, to ſee how they ſquare with it: and ſhall not diſmiſs it till I have evinced that thoſe which I preſt, in the precedent Part, as Objections againſt the ſeveral ways there propounded, all fall in here, and are the cleareſt and moſt convincing Arguments of the truth hereof: that this, and this alone, does naturally and eaſily account for all thoſe Circumſtances: and fairly takes off all Difficulties. Which Difficulties I propoſe at large, and particularly thoſe which have of late been urged, by ſome Learned Men, as proofs that theſe Bodies were not left behind by the Deluge; ſhewing of how little Validity they are.

Which being diſpatch'd, I return back to my Obſervations; and proceed upon them to repreſent the *Effects* that the Deluge had upon the Earth, and the *Alterations* that it wrought in the Globe; ſome whereof were indeed very extraordinary. *Theſe* I diſtribute into two Claſſes; the *firſt* of which will contain *thoſe* that are *only* probable, and of which we have ſome reaſonable Intimations, but not an abſolute and demonſtrative Certainty; the Proofs whereon they depend being more remote. And theſe I ſhall wholly wave at preſent; and not crowd this ſhorter Treatiſe with the Relation of them, reſerving that room for *thoſe* of the *ſecond* Claſs, which are thoſe whereof we have a plain and undeniable Certainty: thoſe which flow directly and immediately from the Obſervations: and which are ſo evident, that 'tis impoſſible theſe Marine Bodies could have been any ways lodged in ſuch manner, and to ſo great depths, in the Beds of Stone, Marble, Chalk, and the reſt, had not theſe Alterations all happened. Namely,

2. That during the time of the Deluge, whilſt the Water was out upon, and covered the Terreſtrial Globe, All the Stone and Marble of the Antediluvian Earth: all the Metalls of it: all Mineral Concretions: and, in a word, all Foſſils whatever that had before obtained any Solidity, were totally diſſolved, and their conſtituent Corpuſcles all disjoyned, their Cohæſion perfectly ceaſing. That the ſaid Corpuſcles of theſe ſolid Foſſils, together with the Corpuſcles of thoſe which were not before ſolid, ſuch as Sand, Earth, and the like: as alſo all Animal Bodies, and parts of Animals, Bones, Teeth, Shells: Vegetables, and

parts of Vegetables, Trees, Shrubs, Herbs: and, to be ſhort, all Bodies whatſoever that were either upon the Earth, or that conſtituted the Maſs of it, if not quite down to the Abyſs*, yet at leaſt to the greateſt depth we ever dig: I ſay all theſe were aſſumed up promiſcuouſly into the Water, and ſuſtained in it, in ſuch manner that the Water, and Bodies in it, together made up one common confuſed Maſs.

3. That at length all the Maſs that was thus borne up in the Water, was again precipitated and ſubſided towards the bottom. That this Subſidence happened generally, and as near as poſſibly could be expected in ſo great a Confuſion, according to the Laws of Gravity †: *that* Matter, Body, or Bodies, which had the greateſt quantity or degree of Gravity, ſubſiding firſt in order, and falling loweſt: *that* which had the next, or a ſtill leſſer degree of Gravity, ſubſiding next after, and ſettling upon the precedent: and ſo on in their ſeveral Courſes; *that* which had the leaſt Gravity ſinking not down till laſt of all, ſettling at the Surface of the Sediment, and covering all the reſt. That the

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* *Vid.* Part 3. Sect. 1. Conſect. 1.

† *Confer.* p. 29. &c.

Matter, ſubſiding thus, formed the *Strata* of Stone, of Marble, of Cole, of Earth, and the reſt; of which *Strata*, lying one upon another, the Terreſtrial Globe, or at leaſt as much of it as is ever diſplayed to view, doth mainly conſiſt. That the *Strata* being arranged in this order meerly by the diſparity of the Matter, of which each conſiſted, as to Gravity, that Matter which was heavieſt deſcending firſt, and all that had the ſame degree of Gravity ſubſiding at the ſame time: and there being Bodies of quite different Kinds, Natures, and Conſtitutions, that are nearly of the ſame ſpecifick Gravity, it thence happened that Bodies of quite different kinds ſubſided at the ſame inſtant, fell together into, and compoſed the ſame *Stratum*. That for this reaſon the Shells of thoſe Cockles, Eſcalops, Perewinkles, and the reſt, which have a greater degree of Gravity, were encloſed and lodged in the *Strata* of Stone, Marble, and the heavier kinds of Terreſtrial Matter: the lighter Shells not ſinking down till afterwards, and ſo falling amongſt the lighter Matter, ſuch as Chalk, and the like, in all ſuch parts of the Maſs where there happened to be any conſiderable quantity of Chalk, or other Matter lighter than Stone; but where there was *none*, the ſaid Shells fell upon, or near unto, the Surface: and that accordingly we now find the lighter kinds of Shells, ſuch as thoſe of the *Echini*, and the like, very plentifully in Chalk, but of the heavier kinds ſcarcely one ever appears; theſe ſubſiding ſooner, and ſo ſettling deeper, and beneath the *Strata* of Chalk. That Humane Bodies, the Bodies of Quadrupeds, and other Land-Animals, of Birds, of Fiſhes, both of the Cartilaginous, Squamoſe, and Cruſtaceous kinds; the Bones, Teeth, Horns, and other parts of Beaſts, and of Fiſhes: the Shells of Land-Snails: and the Shells of thoſe River and Sea Shell-Fiſh that were lighter than Chalk &c. Trees, Shrubs, and all other Vegetables, and the Seeds of them: and that peculiar Terreſtrial Matter whereof theſe conſiſt, and out of which they are all formed: I ſay all theſe (except ſome Mineral or Metallick Matter happened to have been affix'd to any of them *, whilſt they were ſuſtained together in the Water, ſo as to augment

* Part 4. Conſect. 2.

ment the weight of them) being, bulk for bulk, lighter than Sand, Marl, Chalk, or the other ordinary Matter of the Globe, were not precipitated till the laſt, and ſo lay above all the former, conſtituting the ſupreme or outmoſt *Stratum* of the Globe. That *theſe* being thus lodged upon the reſt, and conſequently more nearly expoſed to the Air, Weather, and other Injuries; the Bodies of the Animals would ſuddenly corrupt and rot: the Bones, Teeth, and Shells, would likewiſe all rot in time, except thoſe which were ſecured by the extraordinary Strength and Firmneſs of their Parts, or which happened to be lodged in ſuch places where there was great plenty of bituminous or other like Matter to preſerve, and, as it were, embalm them: that the Trees would in time alſo decay and rot, unleſs ſuch as chanced to be repoſed in, and ſecured by the ſame kind of Matter: that the other more tender Vegetables, Shrubs, and Herbs, would rot likewiſe and decay: But the Seeds of all kinds of Vegetables, being by this means repoſed, and, as it were, planted near the Surface of the Earth, in a convenient and natural

Soil, amongſt Matter proper for the Formation of Vegetables, would germinate, grow up, and repleniſh the face of the Earth: And that vegetative terreſtrial Matter, that fell, along with theſe, into this uppermoſt *Stratum*, and of which principally it conſiſts, hath been ever ſince, and will continue to be, the ſtanding fund and promptuary out of which is derived the Matter of all Animal and Vegetable Bodies, and whereinto, at the Diſſolution of thoſe Bodies, that Matter is reſtored back again ſucceſſively for the Conſtitution and Formation of others.

4. That the *Strata* of Marble, of Stone, and of all other *ſolid* Matter, attained their Solidity, as ſoon as the Sand, or other Matter whereof they conſiſt, was arrived at the bottom, and well ſettled there: And that all thoſe *Strata* which are ſolid at this day, have been ſo ever ſince that time.

5. That the ſaid *Strata*, whether of Stone, of Chalk, of Cole, of Earth, or whatever other Matter they conſiſted of, lying thus each upon other, were all originally parallel: that they were plain, eaven, and regular; and the Surface of the Earth likewiſe eaven

and ſpherical: that they were continuous, and not interrupted, or broken: and that the whole Maſs of the Water lay then above them all, and conſtituted a fluid Sphere environing the Globe.

6. That after ſome time the *Strata* were broken, on all ſides of the Globe: that they were diſlocated, and their Situation varied, being elevated in ſome places, and depreſſed in others.

7. That the Agent, or force, which effected this Diſruption and Diſlocation of the *Strata*, was ſeated *within* the Earth.

8. That all the Irregularities and Inequalities of the Terreſtrial Globe were cauſed by this means: date their Original from this Diſruption, and are all entirely owing unto it. That the natural *Grotto's* in Rocks, and thoſe Intervals of the *Strata*, which, in my Obſervations, I call the *Perpendicular Fiſſures*, are nothing but theſe Interruptions or *Breaches* of the *Strata*. That the more eminent Parts of the Earth, *Mountains* and *Rocks*, are only the Elevations of the *Strata*; theſe, wherever they were ſolid, rearing againſt and ſupporting each other in

the poſture whereinto they were put by the burſting or breaking up of the Sphere of Earth ‖: and not falling down again, nor returning to their former and more level ſite, as did the *Strata* of Earth, and other Matter that was not ſolid, and had no *Strata* of Stone, or other conſiſtent Matter, interpoſed, amongſt their *Strata*, underneath, to uphold them in the poſture they were then raiſed into. For which reaſon 'tis, that Countries which abound with Stone, Marble, or other ſolid Matter, are uneaven and mountainous: and that thoſe which afford none of theſe, but conſiſt of Clay, Gravel, and the like, without any Stone *&c.* interpoſed, are more champaign, plain, and level. That the lower parts of the Earth, *Vallies*, the *Chanel of the Sea*, and the reſt, are nothing but Depreſſions of the *Strata*. That *Iſlands* were formed and diſtinguiſhed by the Depreſſion or ſinking down of the *Strata* lying betwixt each of them, and betwixt them and the Continent. In one word, that the *whole terraqueous Globe* was, by this means, at the time of the Deluge, put into the Condition that we now behold.

‖ *Conf.* *Conſ.* 5. ſupra.

Here was, we ſee, a mighty Revolution: and *that* attended with Accidents very ſtrange and amazing: the moſt horrible and portentous Cataſtrophe that Nature ever yet ſaw: an elegant, orderly, and habitable Earth quite unhinged, ſhattered all to pieces, and turned into an heap of ruins: Convulſions ſo exorbitant and unruly: a Change ſo exceeding great and violent, that the very Repreſentation alone is enough to ſtartle and ſhock a Man. In truth the thing, at firſt, appeared ſo wonderful and ſurprizing to me, that I muſt confeſs I was for ſome time at a ſtand; nor could I bring over my Reaſon to aſſent, untill, by a deliberate and careful Examination of all Circumſtances of theſe Marine Bodies, I was abundantly convinced that they could not have come into thoſe Circumſtances by any other means than ſuch a Diſſolution of the Earth, and Confuſion of things. And were it not that the Obſervations, made in ſo many, and thoſe ſo diſtant, places, and repeated ſo often with the moſt ſcrupulous and diffident Circumſpection, did ſo eſtabliſh and aſcertain the thing, as not to leave any room for Conteſt or

Doubt, I could ſcarcely ever have credited it.

And though the whole Series of this extraordinary *Turn* may ſeem at firſt view to exhibit nothing but Tumult and Diſorder: nothing but hurry, jarring, and diſtraction of things: though it may carry along with it ſome ſlight ſhew that 'twas managed blindly and at random: yet if we draw ſomewhat nearer, and take a cloſer proſpect of it: if we look into its retired Movements, and more ſecret and latent Springs, we may there trace out a ſteady Hand, producing good out of evil: the moſt conſummate and abſolute Order and Beauty, out of the higheſt Confuſion and Deformity: acting with the moſt exquiſite Contrivance and Wiſdom: attending vigilantly throughout the whole Courſe of this grand Affair, and directing all the ſeveral Steps and Periods of it to *an End,* and that a moſt noble and excellent one; no leſs than the Happineſs of the whole race of Mankind: the Benefit, and univerſal Good, of all the many Generations of Men which were to come after: which were to inhabit this Earth, thus moduled anew, thus ſuited to their preſent Condition and Neceſſities.

But the Preſidence of that mighty Power in this Revolution: its particular Agency and Concern therein: and its Purpoſe and *Deſign* in the ſeveral Accidents of it, will more evidently appear, when I ſhall have proved,

That, altho' one Intention of the Deluge was to inflict a deſerved Puniſhment upon *that Race* of Men, yet it was not ſolely levelled againſt Mankind, but principally againſt the Earth that then was; with deſign to deſtroy and alter that Conſtitution of it, which was apparently calculated and contrived for a ſtate of Innocence: to faſhion it afreſh, and give it a Conſtitution more nearly accommodated to the preſent Frailties of its Inhabitants.

That the ſaid Earth, though not indifferently and alike fertil in all parts of it, was yet generally much more fertil than *ours* is. That the exteriour *Stratum* or Surface of it, conſiſted entirely of a kind of terreſtrial Matter proper for the Nouriſhment and Formation of Plants, and this in great *Plenty* and *Purity*; being little, or not at all, entangled with an Intermixture of meer Mineral Matter that was unfit for Vegetation. That its Soil was more luxuriant, and teemed forth its Productions in far greater plenty and abundance than the preſent Earth does. That the Plough was then of no uſe, and not invented till after the Deluge; that *Earth* requiring little or no Care or Culture; but yeilding its encreaſe freely, and without any conſiderable Labour and Toil, or aſſiſtance of Humane Induſtry; by this means allowing Mankind that time, which muſt otherwiſe have been ſpent in Agriculture, Plowing, Sowing, and the like, to far more divine and noble Uſes: to Purpoſes more agreeable to the Deſign of their Creation; there being no hazard, whilſt they continued in that ſtate of Perfection, of their abuſing this Plenty, or perverting it to any other end than the ſuſtenance of Nature, and the neceſſary ſupport of Life.

That when Man was *fallen*, and had abandoned his primitive Innocence, the Caſe was much altered, and a far different Scene of Things preſented; that generous Vertue, maſculine Bravery, and prudent Circumſpection which he was before Maſter of, now deſerted him, together with that Innocence which was the Baſis and Support of all: and a ſtrange imbecility immediately ſeized and laid hold of him: he became puſillanimous, and was eaſily ruffled with every little Paſſion within: ſupine, and as openly expoſed to any Temptation or Aſſault from without. And *now* theſe exuberant Productions of the Earth became a continual Decoy and Snare unto him: they only excited and fomented his Luſts, and miniſtred plentiful Fewel to his Vices and Luxury; and the Earth requiring little or no Tillage, there was little occaſion for Labour; ſo that almoſt his whole time lay upon his hands, and gave him leiſure to contrive, and full ſwing to purſue his Follies; by which means he was laid open to all manner of Pravity, Corruption, and Enormity; and we need not be much ſurprized to hear *That the wickedneſs of Man was great in the Earth, and that every imagination of the thoughts of his heart was only evil continually* * : nor more, that that Generation of Men was more particularly addicted to Intempe-

*Gen.* vi. 5.

temperance, Senſuality, and Unchaſtity: that they ſpent their time in Gluttony, in *Eating and Drinking*, in Luſt and Wantonneſs, or, as the ſacred Writer cleanly and modeſtly expreſſes it, in *marrying, and giving in marriage*||, and this without Diſcretion or Decency: without regard to Age or Affinity: but promiſcuouſly, and with no better a Guide than the Impulſes of a brutal Appetite, *They took them Wives of all which they choſe**; Plenty and Abundance, Idleneſs and Eaſe, ſo naturally cheriſhing and promoting thoſe particular Vices: nor laſtly, that the Apoſtacy was ſo great, the Infection ſo univerſal: that *the Earth was filled with violence*, and that *all fleſh had corrupted his way*†; the Cauſe of this Corruption, the Fertility of that Earth, being ſo univerſal, ſo diffuſive and epidemical. And indeed, 'twould be very hard to aſſign any other ſingle Cauſe, beſides this, that could ever poſſibly have had ſo ſpreading and general an Effect as this had. The Pravity of humane Nature is not, I fear, leſs than it was *then*: The Paſſions of Men are yet as exorbitant, and their Inclinations as vicious: Men have been wicked ſince the

|| *Matth.* xxiv. 38.

* *Gen.* vi. 2.

† *Gen.* vi. 11, 12.

the Deluge: they are ſo ſtill: and will be ſo, but not univerſally; there are now bounds ſet to the Contagion, and 'tis reſtrained by removing the main cauſe of it; but *there*, the Venom manifeſted it ſelf on all hands: ſpread far and near: and ſcarcely ſtop'd till 'twas inſinuated into the whole maſs of Mankind, and the World was little better than a common fold of Phrenticks and Bedlams.

That to reclaim and retrieve the World out of this wretched and forlorn ſtate, the common Father and Benefactor of Mankind ſeaſonably interpoſed his hand: and reſcued miſerable Man out of the groſs Stupidity and Senſuality whereinto he was thus unfortunately plunged. And this he did partly by tying up his hands, and ſhortning the power of ſinning: checking him, in the Career of his Follies, by Diſeaſes and Pains: and ſetting Death, the King of Terrors, which before ſtood aloof off, and at the long diſtance of eight or nine hundred Years, now much nearer to his view, ordaining * that *his days ſhall be* but *an hundred and twenty years* †: and partly by removing the Temptation, and

* *Confer. Part 6. Diſ.* 3.

† *Gen.* 6. 3.

and cauſe of the Sin: by *deſtroying* * that Earth which had furniſh'd forth Maintenance in ſuch ſtore unto it: by changing that Conſtitution of it, and rendring it more agreeable to the laps'd and frail ſtate of Mankind. That this Change was not wrought by altering either the form of the Earth, or its Poſition in reſpect of the Sun, as was not long ago ſurmiſed by a very Learned Man †, but by diſſolving || it: by reducing all the Matter of it to its firſt conſtituent Principles: by mingling, and confounding them: the Vegetative with mineral Matter, and the different kinds of mineral Matter with each other **: and by retrenching a conſiderable quantity of the vegetable Matter, (which lay in ſuch plenty and purity at the Surface of the Antediluvian Earth, and rendred it ſo exube-

rantly

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* Gen. vi. 13. *And behold I will DESTROY them with THE EARTH.* And again, at the Covenant made with *Noah*, after the Deluge; more diſtinctly *Gen.* ix. 11. *Neither ſhall all fleſh be cut off any more by the waters of a flood: neither ſhall there any more be A FLOOD TO DESTROY THE EARTH*; the latter part whereof is render'd ſomewhat more expreſly by the Septuagint καὶ οὐκ ἔτι ἔσται κατακλυσμὸς ὕδατος καταφθεῖραι ΠΑ͂ΣΑΝ τὴν γῆν. i. e. *And there ſhall not be any more a Deluge of Water to deſtroy the WHOLE EARTH.* And the vulg. Lat. *Neque erit deinceps Diluvium* diſſipans *terram*, i. e. Neither ſhall there be hereafter a Deluge to *diſſipate* [ or diſſolve ] the Earth. And of this *Diſſolution* of the Earth there was a *Tradition* amongſt the *Ancients*, both *Jews* and *Gentiles*.

† *Dr.* Burnet. *Theory of the Earth.*

|| *Vid.* *Conſ.* 2. ſupra.

** *Part* 4. *Conſ.* 3.

rantly fruitful) and precipitating it, (at the time of the ſubſidence ‖ of the general Maſs of Earth and other Bodies, which were before raiſed up into the Water) to ſuch a depth as to bury it, leaving only ſo much of it near the Surface as might juſt ſufficiently ſatisfie the Wants of humane Nature, but little or no more; and even *that* not pure, not free from the intermixture of meer ſteril mineral Matter, and ſuch as is in no wiſe fit for the Nutrition of Vegetables; but ſo that it ſhould require Induſtry and Labour to excite it, and not yeild a competent Crop without Tillage and Manure. That by this means, a great part of that time, which the Inhabitants of the former Earth had to ſpare, and whereof they made ſo ill uſe, was employed, and taken up in Digging and Plowing, in making proviſion for bread, and for the Neceſſities of Life: and the Exceſs of Fertility, which contributed ſo much to *their* Miſcarriages, was retracted and cut off.

‖ *Vid.* Conſ. 3. *Supra.*

That had the Deluge been aimed *only at Mankind:* and its utmoſt deſign meerly to puniſh that Generation, and thereby to deterr Poſterity from the like Offences; this might have been brought about by means much more compendious, and obvious too, and yet equally terrifying and exemplary. Mankind, I ſay, might have been taken off at a far cheaper rate: without this ranſacking of Nature, and turning all things topſie-turvy: without this battering of the Earth, and unhinging the whole frame of the Globe. The Buſineſs might have been done as effectually by Wars; the Heart of every Man of them was in the hand of God, and he could eaſily have made them Executioners of his Wrath upon one another. He had the command of Famine, of Peſtilence, and a thouſand other Diſaſters, whereby he could have carried them off by ſholes, yea ſwept them all clear away. Beſides, he had the whole Artillery of the Sky in his power, and might preſently have Thunder ſtruck them all, or deſtroyed them by Fire from Heaven. But none of all *theſe* were uſed, though 'tis moſt apparent that any of them would have been as fatal and pernicious to Man as the Deluge was, for the Deſign lay a great deal deeper, and *theſe* would have fallen ſhort of it: *theſe* would never have reach'd the Earth, nor affected *that* in the leaſt: they could never have touch'd the Head, or ſtop'd the ſource of theſe unhappy miſdemeanours, for which the Puniſhment was ſent. *That* was what nothing but a Deluge could reach; and as long as the Cauſe remained; as long as the old Temptation was ſtill behind, every Age would have lain under freſh Inducements to the ſame Crimes: and there would have been a new neceſſity to puniſh and reclaim the World: to depopulate the Earth, and reduce it again to a vaſt Solitude, as conſtantly as there ſucceeded a new Age and Race of Men. For the terror of the Calamity would not have extended it ſelf much farther than the Men which ſuffered under the weight of it: and a few Years would have worn out, in great meaſure, the Impreſſions it made. This we ſee even from the Example of the Deluge it ſelf. As formidable as *this* was to thoſe who lived at, or near, the time of it: who ſaw the prodigious Devaſtations it made: the horrible Methods by which 'twas brought about: and the Reaſon why 'twas inflicted; and to their Poſterity, for a few Generations; yet the Fright was not laſting: 'twas not long e're the Sting of it was worn out. And though the Elder Ages knew full well that there had been ſuch a Deluge: and had ſome Tradition of the cruel Deſolation it made; yet by degrees the Particulars of it were drop'd, and the moſt frightful Paſſages bore the leaſt ſhare in the Relation; being probably ſo ſtrange as to be hardly credible; and carrying rather an appearance of Figment and Invention, in thoſe that handed down the memory of it, than of Truth and Reality. So that upon the whole 'tis very plain that the Deluge was not ſent only as an Executioner to Mankind: but that its prime Errand was to reform and *new-mold the Earth.*

That therefore as much Harſhneſs and Cruelty as this great Deſtruction of Mankind ſeemingly carries along with it: as wild and extravagant a thing as that Diſſolution of the primitive Earth appeared at firſt ſight, yet all the Severity lay in the Puniſhment of that Generation, (which yet was no more than what was highly juſt, yea and neceſſary too:) and the *whole* of the Tragedy terminated there. For the *Deſtruction* of the *Earth* was not only an Act of the profoundeſt Wiſdom and Forecaſt, but the moſt monumental proof that could ever poſſibly have been, of Goodneſs, Compaſſion, and Tenderneſs, in the Author of our *Being*; and *this* ſo liberal too and extenſive, as to reach all the ſucceeding Ages of Mankind: all the Poſterity of *Noah*: all that ſhould dwell upon the thus renewed Earth to the End of the World; by this means removing the old Charm: the Bait that had ſo long bewildred and deluded unhappy Man: ſetting him once more upon his Legs: reducing him from the moſt abject and ſtupid Ferity, to his Senſes, and to ſober Reaſon: from the moſt deplorable Miſery and Slavery, to a Capacity of being happy.

That notwithſtanding that this Remedy ſtruck as deep at the Intellectuals, as at the Morals of Mankind: that Ignorance and Rudeneſs would be as neceſſary a Conſequence of it, as Reformation of Life: and that this ſo general Employ and Expence of their time would as aſſuredly curtail and retrench the ordinary means of Knowledge and Erudition*, as 'twould ſhorten the Opportunities of Vice: And ſo accordingly it fell out; An univerſal Ruſticity preſently took place, ſpread on all hands, and ſtop'd not till it had over-run the whole ſtock of Mankind. Thoſe firſt Ages of the new World were ſimple, and illiterate to Admiration; and 'twas a long time e're the Cloud was withdrawn: e're the leaſt ſpark of Learning (I had almoſt ſaid of Humanity) broke forth, or any Man betook himſelf to the promotion of Science. Nay the Effects of it are viſible to this hour: a general Darkneſs yet prevails, and hangs over whole Nations, yea the far greater part of the World is ſtill barbarous and ſavage. I ſay, tho 'twas moſt evident that this Remedy muſt needs have *this* Conſequence alſo as well as the *other*, yet it was not ſuſpended or chang'd upon that account; An egregious and pregnant inſtance how far Vertue ſurpaſſes Ingenuity: how much an honeſt Simplicity, Probity of Mind, Integrity and Incorruptneſs of Manners, is preferable to fine Parts, profound Knowledge, and ſubtile Speculations. I would not have this interpreted an invective

againſt

* *Confer.* p. 55. & ſeq.

againſt Humane Learning, or a decrying any commendable Accompliſhments either of Body or Mind, (that is what no Man will, I hope, ſuſpect me of) but only an intimation that *theſe* are not of any ſolid uſe, or real advantage, unleſs when aiding and ſerviceable to the *other*.

Nor does this grand Cataſtrophe only preſent us with Demonſtrations of the Goodneſs, but alſo of the Wiſdom and Contrivance of its Author. There runs a long train of Providence thro' the *whole*: and ſhines brightly forth of all the various Accidents of it. The Conſolidation of the Marble, and of the Stone, immediately after their Settlement to the bottom: the diſruption of the *Strata* afterwards: their Diſlocation, the Elevation of ſome, and Depreſſion of others, of them, did not fall out at random, or by *chance*, but were managed and directed by a more ſteady and diſcerning Principle; for proof whereof, this is indeed the proper place: but, in regard that there are ſome things advanced in the ſucceeding, or third, Part of this Diſcourſe, which give ſome farther light to this matter, I ſhall beg leave to break off here, and to deſert it a while, untill I have firſt propoſed them.

Thus have I drawn up a *brief Scheme* of what befell the Earth at the *Deluge:* and of the *Change* that it then underwent. I have, by comparing its Antediluvian * with its preſent ſtate, found where chiefly the *Difference* lay; *viz.* in degree of Fertility. I have endeavour'd alſo to diſcover the *Reaſon* why this Change was made in it. For ſince that the Proceſs of it was ſo ſolemn and extraordinary: that there were ſo many, and thoſe ſo ſtrange things done: that the *firſt Earth* was perfectly unmade again, taken all to pieces, and framed a-new; and indeed, the very ſame Method that was uſed in the original Formation of it, uſed likewiſe in this Renovation; *our Earth* ſtanding the firſt ſtep after its Diſſolution, in the ſame poſture that the *Primitive Earth* did the firſt ſtep after its *Riſe* out of Nothing; which the Reader will eaſily find by conferring the fifth Propoſition of this Part with *Gen.* i. v. 2. and 9: ſince likewiſe there was ſo mighty an Hand † concerned, and which does not act without great and weighty Reaſons, there could be no doubt but

* *Conf. Part 6.*

† *Conf.* [illegible] 5. *Sect. Conf.* 7.

that there was ſome real and very neceſſary Cauſe for the making that Alteration. Nor was ſuch a Cauſe very hard to be found out. The firſt Earth was ſuited to the firſt ſtate of Mankind; who were the Inhabitants of it, and for whoſe uſe 'twas made. But when Humane Nature had, by *the Fall*, ſuffer'd ſo great a Change, 'twas but neceſſary that the Earth ſhould undergo a Change too, the better to accommodate it to the Condition that Mankind was *then* in: and *ſuch* a Change the Deluge brought to paſs.

But leaſt that the *Brevity* which I have above uſed, and which indeed I am tied up to, in my Repreſentation of this matter, ſhould render it liable to Miſconſtruction: or that any one ſhould ſuſpect, that what I have delivered concerning the Fertility of *that Earth*, does not well ſquare with the Moſaick Deſcription of it, I muſt beg leave to make a Digreſſion here, that I may explain my ſelf a little more upon that Head. And that the Reader may himſelf be Judge in the Caſe, I ſhall fairly lay down *Moſes*'s ſenſe of it in his own words.

Ver. 17. *And unto Adam he ſaid, becauſe thou haſt hearkned unto the Voice of thy wife, and haſt eaten of the Tree of which I commanded thee, ſaying, thou ſhalt not eat of it: Curſed is the ground for thy ſake; in ſorrow ſhalt thou eat of it all the days of thy life.* *Gen.* iii.

Ver. 18. *Thorns alſo and Thiſtles ſhall it bring forth to thee: and thou ſhalt eat the herb of the field.*

Ver. 19. *In the ſweat of thy face ſhalt thou eat bread, till thou return unto the ground; for out of it waſt thou taken: for duſt thou art, and unto duſt ſhalt thou return.*

Ver. 23. *Therefore the Lord God ſent him forth from the Garden of Eden, to till the ground from whence he was taken.*

Ver. 2. *Cain was a tiller of the ground.* *Gen.* iv.

All which may be well reduced to two plain and ſhort Propoſitions,

1. That *Adam*'s Revolt drew down a Curſe upon the Earth.

2. That there was ſome ſort of Agriculture uſed before the Deluge.

As to the former, the Curſe upon the Earth, I ſhall not in the leaſt go about to extenuate the Latitude of it: or to ſtint it only to the Production of Weeds, of *Thorns*, *Thiſtles*, and other the leſs uſeful kinds of Plants: but ſhall give it its full ſcope, and grant that no leſs than an univerſal Reſtraint and Diminution of the primitive Fruitfulneſs of the Earth was intended by it; this indeed ſeeming to be the plain and genuine meaning of the words. But the Queſtion is, whether this Curſe was preſently inflicted or not: whether it was ſucceeded with an univerſal Sterility, and the Earth's native and original Exuberance all ſtraitways check'd, and turn'd to as general a Deſolation and Barrenneſs. And here I entreat it may be taken notice, that *this* was but *one*, and that much the leſſer, part of the Sentence paſt upon *Adam*. The *other* was Death *; which, 'tis moſt certain, was not immediately inflicted. And yet *this* was pronounc'd at the ſame time and with the ſame breath, that the other was: *Unto duſt ſhalt thou return.* Nay and much more emphatically a little before ||, *In the day that thou eateſt thereof thou ſhalt* ſurely *dye.* This was exceedingly peremptory: and the very day fix'd likewiſe. Notwithſtanding, through the Clemency and Goodneſs of God, Execution was delayed for a long time; *Adam* being reprieved

* *Conf.* Rom. v. 12. *and* 1 Cor. xv. 21, 22.

|| *Gen.* ii. 17.

reprieved for eight or nine hundred years †. The Dominion of Death over him commenc'd indeed not only the ſame day that Sentence was paſt, but the very minute that he taſted the forbidden ~~Fruit;~~ and Mortality went hand in hand with the Tranſgreſſion: but 'twas a long time before it had raiſed any Trophies, or made a final and abſolute Conqueſt.

Why therefore may we not as well ſuppoſe the other part of the Sentence, the Sterilizing the Earth, was alſo ſuſpended for ſome time, and deferr'd till the Deluge happened, and became the Executioner of it? 'Tis certainly very hard to imagine that God ſhould deſtroy the Work of his hands almoſt as ſoon as he had finiſh'd it: that all things ſhould be unhinged again by ſuch time as they were well ranged and put in order: and that the Fragrancy and lovely Verdure which then appeared every where, and which had but juſt ſhewed it ſelf, ſhould be nip'd in the bud, and blaſted all of a ſudden. To be ſhort, 'tis, I think, moſt apparent, that as on the other part Mortality did preſently enter and take place, but got not full poſſeſſion of many

† Gen.v. 5.

Ages after: ſo here, Thorns, Thiſtles, and other the like Conſequences of this Curſe, immediately ſprung out of the Ground, and manifeſted themſelves on every ſide, but it had not its full effect, nor was the Earth impoveriſh'd, or its Fertility, ſenſibly curb'd, till the Deluge. And for proof of this I appeal to the Remains of *that Earth:* the Animal and Vegetable Productions of it ſtill preſerved; the vaſt and incredible Numbers whereof notoriouſly teſtifie the extreme Luxuriance and Fœcundity of it; and I need but produce *theſe* as Evidences that at the time that the Deluge came, the Earth was ſo loaded with Herbage, and throng'd with Animals, that ſuch an Expedient was even wanting to eaſe it of the burden, and to make room for a ſucceſſion of its Productions. For this alſo I appeal to *Moſes* himſelf, who openly acknowledgeth that this Curſe did not take place effectually till the Deluge. For he tells us, that, after the Deluge was over, and *Noah* and his Family come forth of the Ark. *He builded an Altar unto the Lord, and offered burnt-offerings on the Altar: and the Lord ſmelled a ſweet ſavour, and the Lord ſaid in his heart, I will not again*

Curſe the Ground *any more, neither will I again ſmite any more every thing living as I have done* *. Wherein he plainly refers to the Curſe denounc'd above, at the Apoſtacy of *Adam*: implying the it was not fulfilled till the Deluge. And a little after he as plainly intimates, that the fulfilling of it lay in the Deſtruction of the Earth then wrought. For, ſpeaking again of the ſame thing, inſtead of the Expreſſion [*Curſe the Ground*] here uſed, he makes uſe of [*Deſtroy the Earth.*] The whole Paſſage runs thus; *And I will eſtabliſh my Covenant with you, neither ſhall all fleſh be cut off any more by the waters of a flood: neither ſhall there any more be a* Flood to deſtroy the Earth *.

Nor is it indeed in any wiſe ſtrange that this Curſe had not it's Effect ſooner: eſpecially ſince 'twas not limited to any time. There are ſo many Preſidents on Record in Holy Writ of this way of proceeding, that no one can be well ignorant of them; ſo that I ſhall not need to charge this place with more than one, and that ſhall be the Caſe of *Ham*, for which we are likewiſe beholden to the ſame Author,

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* *Gen.* viii. 20, 21.

* *Gen.* ix. 11.

*Moſes.* This Perſon, by his indiſcreet and unnatural Irriſion and expoſing of his Father, incurrs his Indignation, and Curſe. But, which is very remarkable, *Noah* does not lay [illegible] Curſe upon *Ham*, who was actuall[illegible]ty of the Crime, whether ou[illegible] greater Tenderneſs, he being of the two nearer allied unto him, or for what other reaſon I ſhall not here enquire, but transferrs it to Canaan: *Curſed be Canaan, a Servant of Servants ſhall he be to his Brethren:* to *Shem* and to *Japhet.* Nay, which is ſtill more, this was never inflicted upon *Canaan* in perſon, but upon his Poſterity; and that not till many Generations afterwards, at ſuch time as the *Iſraelites* returning out of *Egypt*, poſſeſt themſelves of the Country of the *Canaanites*, and made *them* their Servants. The Story is ſo well known, that I ſhall not need to point it out to the Reader, who may peruſe it at his leiſure. 'Twas well onwards of a thouſand Years before ever this Curſe began to take effect: before the *Canaanites* were brought under Servitude by the *Iſraelites*, who were deſcended from *Shem*: and a great many more before 'twas finally accompliſhed, and *they* ſubjected unto the Poſte-

‖ *Gen* ix. 25, 26, 27.

rity of *Japhet.* To conclude, 'twas really a longer time before *this*, than it was before *the other*, the Curſe upon the Earth, was fully brought about.

To proceed therefore to the other Point, the Tillage of the Earth before the Deluge. That there was Tillage beſtowed upon it *Moſes* does indeed intimate in general and at large: but whether it was beſtowed on all, or only upon ſome parts of that Earth: as alſo what ſort of Tillage that was, and what Labour it coſt, is not expreſt; ſo that for all this we are at liberty, and may uſe our Diſcretion. For the preſent I muſt paſs by the Enquiry: but in due place I hope to give ſome Satisfaction in it, and to ſhew that *their* Agriculture was nothing near ſo laborious, and troubleſome, nor did it take up ſo much time as *ours* doth. That's a Conſequence of the Proof of the greater Fertility of that Earth; it being plain that the more it exerted that Fertility, the leſs need there was of Manure, of Culture, or Humane Induſtry to excite and promote it. Nor can any Man reaſonably ſuſpect, becauſe of this mention of Tillage, that the Curſe upon the Ground was come on, or that the primitive Exuberance of the Earth was leſſened and abridged, before the Deluge; for *Moſes* makes mention of Tillage before ever *Adam* was created: *There was not*, ſays he †, *a man to till the ground*: and conſequently, there would have been requiſite ſuch a Tillage as this which he ſpeaks of in theſe three Chapters, tho' the Curſe had never been denounc'd, or Man had not fallen. But 'tis highly probable that upon *Adam*'s Diſobedience, Almighty God chaſed him out of Paradiſe, the faireſt and moſt delicious part of that Earth, into ſome other the moſt barren and unpleaſant of all the whole Globe; the more effectually to ſignifie his Diſpleaſure, and to convince that unhappy Man how great a Misfortune and Forfeiture he had incurred by his late Offence. And here, above all other Parts of the Earth, there would be Work and Employ for him, and for his Son *Cain*.

And thus much may ſerve for the preſent, to ſhew that my Account of the Antediluvian Earth is ſo far from interfereing with that which *Moſes* hath given us, that it holds forth a natural and unforc'd Interpretation of his

Senſe

† *Gen.* ii. 5.

Senſe on this Subject. There are a few other Paſſages in the ſame Author which may require ſome Explication: but they are none of them ſuch that a Reader of moderate Underſtanding may not eaſily clear them, without my Aſſiſtance, ſo that I ſhall not crowd this Piece with them; for I fear 'twill be thought that I have already taken too great a liberty. The Compaſs that I am confined unto, by *the Rules* of this kind of Writing, is ſo narrow, that I am forced to paſs over many things in ſilence, and can but juſt touch upon others. To lay down every thing at length, and in its full light, ſo as to obviate all Exceptions, and remove every Difficulty, would carry me out too far beyond the Meaſures allowed to a Tract of this Nature. That's the Buſineſs of the Larger Work, of which this is only the Module or Platform. In that Work I hope to make amends for theſe Omiſſions, and particularly ſhall conſider

What was the immediate Inſtrument or Means whereby the Stone, and other ſolid Matter of the Antediluvian Earth was diſſolved, and reduced to the Condition mentioned *Conſect.* 2. of this Part.

Why the Shells, Teeth, Bones, and other parts of Animal Bodies: as alſo the Trunks, Roots, and other parts of Vegetables, were not diſſolved, as well as the Stone, and other Mineral Solids of *that Earth*. Of this I ſhall aſſign a plain and Phyſical Reaſon, taken meerly from the *Cauſe* of the Solidity of theſe Mineral Bodies; which I ſhew to be quite *different* from *that*, whereunto Vegetables and Animals owe the Cohæſion of their parts: and that *this* was ſuſpended, and ceaſed, at the time that the Water of the Deluge came forth; which the *other* (I mean the Cauſe of the Cohæſion of the Parts of Animals and Vegetables) did not; with the reaſon of this.

What was the Reaſon that (in caſe the Terreſtrial Globe was entirely diſſolved, and there be now, and was then, a Space or Cavity, in the Central parts of it, ſo large as to give reception to that mighty Maſs of Water which covered the Earth at the Deluge *) the Terreſtrial Matter which firſt ſubſided, (as in *Conſect*. 3. *ſupra*) did not fill the ſaid Cavity, and deſcend quite down to the *Center*, but ſtop'd at that diſtance from it, forming an arched

* *Vid. Part* 3. *Sect*. 1. *Conſect*. 1. and *Sect*. 2. *Conſect*. 3.

ed *Expanſum*, or rather a Sphere around it; which is now the loweſt *Stratum*, and Boundary of that vaſt Conceptacle of Water. As alſo how this Water was raiſed at the Deluge: by what Iſſues or Outlets it came forth: what ſucceeded into the room of it, whilſt abſent: and which way it returned back again.

By what means the *Strata* of Stone, and Marble, acquired ſuch a Solidity, as ſoon as the Matter, whereof they conſiſt, had ſubſided, and was well ſettled to the bottom, as in *Conſect.* 4. of this Part.

What was the immediate Agent which effected that Diſruption of the *Strata*, and their Diſlocation afterwards; whereof in *Conſect.* 6. of this Part.

And becauſe there have been ſome *Conjectures* formerly ſtarted by Learned Men about the Formation of Sand-Stone, the Origin of Mountains, and of Iſlands, that are repugnant to what I have *here* advanc'd upon thoſe Subjects, I am obliged to look a little into the *Reaſons* of them; and, that they may not remain as Obſtacles to thoſe who are leſs skilfull in theſe things, I ſhall weigh their Arguments, detect the Invalidity of them, and prove, againſt them,

That the Sand-Stone now in *being* is not as old as the Earth it ſelf: nor hath it been conſolidated ever ſince the Creation of the World, as ſome Authors have believed.

That Sand-Stone does not now grow by *Juxtapoſition*, as they ſpeak; that is by continual Addition of new Matter; in like manner as the Bodies of Animals and of Vegetables grow, and are augmented; as others were of Opinion.

That Sand-Stone does not ſtill conſolidate: *i.e.* that Matter which was, a few Years ago, lax, incoherent, and in form of Earth, or of Sand, does not become daily more hard and conſiſtent, and by little and little acquire a perfect Solidity, and ſo turn to Stone; as others have aſſerted.

That the Mountains of our Earth have not had *being* ever ſince the Creation: and ſtood as long as the Earth it ſelf; as ſome Writers have thought.

That the ſaid Mountains were not raiſed ſucceſſively, and at ſeveral times, being flung up or elevated by Earthquakes, ſome at one time, and ſome at another, as thoſe Earthquakes happened. That *theſe* are ſo far from raiſing Mountains, that they overturn and fling down, ſome of thoſe which were before ſtanding; and undermine others, ſinking them into the Abyſs underneath †. That of all the Mountains of the whole Globe, which are very *numerous*, and many of them extremely *large*, and conſequently cannot be ſuppoſed to have been all thus raiſed without the Notice of Mankind, yet there is not any authentick Inſtance, in all Hiſtory, of ſo much as one ſingle Mountain that was heaved up by an Earthquake. That the new Mountain in the *Lucrine* Lake, not far from *Pozzuolo* in *Italy*, called *Monte di Cinere*, which is alledged by the Fautors of this Opinion, as an inſtance in behalf of it, was not raiſed thus; the Relators of that Accident, as well thoſe who were then living, as they who wrote ſince, unanimouſly agreeing that this *Tumulus*, or Hill, is no other than an huge heap of Stones, Cinders, Earth, and Aſhes, which were ſpued up out of the bowels of the Earth, by the Eruption of a *Volcano*, which happened there, in the Year 1538. And though

† *Confer.* *Part* 3. *Sect.* 1. *Conſ.* 12.

though this Eruption was preceded by ſeveral Earthquakes (the Country all round having been frequently ſhaken for almoſt the ſpace of two years before) as thoſe of *Ætna*, *Veſuvius*, and *Heclà* uſually are, yet this Hill was not elevated or heaved up by any of thoſe Earthquakes, but the Matter, whereof 'tis compiled, diſcharged out of the *Volcano*, as aforeſaid; in like manner as *Ætna*, *Veſuvius*, and the reſt, fling forth Stones, Cinders, *&c.* upon any extraordinary Eruption of them.

That there have not been any *Iſlands* of note, or conſiderable extent, torn and caſt off from the Continent by Earthquakes, or ſevered from it by the boiſterous Alliſion of the Sea. That *Sicily*, *Cyprus*, the *Negropont*, and many more, which have been ſuppoſed by ſome to be only diſmembered parcels of the Main-land, and anciently parted from it by one or other of theſe means, yet really never were ſo; but have been Iſlands ever ſince the time of the Noetick Deluge.

Unto this Second Part I ſhall annex,

A *Diſcourſe* concerning the Trees, which are commonly called *Subterranean Trees*, or *Foſſil Wood*, and which are found in great plenty buried amongſt other Vegetable Bodies in *Moſſes* *, Fens, or Bogs, not only in ſeveral Parts of *England*, but likewiſe in many Foreign Countries; *wherein* I ſhall ſhew, from Obſervations made upon the Places where theſe Trees are digg'd up: upon the Trees themſelves: their Poſition in the Earth, and other Circumſtances, that they were lodged thus by the *Deluge*, and have lain *here* ever ſince. That there are found *great numbers* of theſe Trees, and many of them *very large*, ſo buried in ſeveral *Iſlands* where no Trees at all do, or will, *now* grow: the Winds being ſo fierce, and the Weather ſo ſevere, as not to ſuffer any thing to proſper or thrive beyond the height of a Shrub, in any of all thoſe Iſlands, unleſs it be protected by Walls, as in Gardens, or other like Coverture. That the ſaid Trees are in ſome places found encloſed in the Stone of Quarries and of Rocks: buried amongſt Marle, and other kinds of Earth, as well as in this Peat or Moſs-Earth. That they were originally lodged indifferently amongſt all ſorts of Earth, or other Matter, which lay near the Surface of the Earth †: and

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* *Moſs* is the Name uſed all over the North of *England* inſtead of *Fen*.

† *Conſ.* *Conſ.* 3. ſupra.

that they are at this day found very ſeldom unleſs in this Peat-Earth, is meerly accidental; this Earth being of a bituminous and mild Nature; ſo that the Trees lay all this while, as it were, embalmed in it, and were by that means preſerved down to our times; whilſt thoſe which chanced to be lodged in other Earth, that was more lax and pervious, decayed in tract of time, and rotted at length, and therefore do not now appear at all, when we dig and ſearch into thoſe Earths; or if any thing of them do appear, 'tis only the Ruins, or ſome ſlight Remains of them; there being very rarely found any Trunks of Trees, in theſe laxer Earths, that are intire, or tolerably firm and ſound. To conclude, from ſeveral of the aforeſaid Circumſtances I ſhall evince that theſe Trees could never poſſibly have been repoſed thus by any other means than the Deluge: neither by Men: nor by Inundations: nor by Deterations*: nor by violent and impetuous Winds: nor by Earthquakes; which are the ſeveral ways whereby Learned Men have thonght they were thus buried.

* Confer. Part 5. Conſect. 2.

PART

# PART III.

## *Concerning the Fluids of the Globe.*

### SECT. I.

*Of the great Abyſs. Of the Ocean. Concerning the Origine of Springs, and Rivers. Of Vapours, and of Rain.*

HAving thus done with the more bulky and Corpulent Parts of the Globe, the next place in courſe is due unto Metalls and Minerals, which are the only remaining part of the Terreſtrial Matter of it not yet treated of. And accordingly I ſhould now paſs on to theſe; but the preſent Oeconomy and Diſpoſal of ſome of them being wholly owing to the Motion and Paſſage of *Water* in the interiour parts of the Earth, I have for that reaſon choſen rather, that I may be as brief as poſſible, and avoid all needleſs Repetitions, to wave *them* for a while, till I have firſt offered what I have to ſay about *that*.

The *Water* therefore of the Globe, as well that reſident in it, as that which floats upon it, is the Subject which I purpoſe here to proſecute. In order whereunto, I ſhall ſub-divide this third Part into two Sections; the former whereof will comprehend what relates to the preſent and natural State of the Fluids in and upon the Earth: the other, what concerns that extraordinary Change of this State which happened at the Deluge, and how that Change was wrought.

At the Head of the firſt of theſe Sections I prefix a new ſet of *Obſervations touching the Fluids of the Terraqueous Globe*: the Sea, Rivers, and Springs: the Water of Mines, of Cole-pits: of Caves, Grotts, and the like Receſſes: as alſo concerning Vapours, Rain, Hail, and Snow.

And becauſe this is a Subject of that vaſt Latitude that the Strength of one ſingle Man will ſcarcely be reckoned ſufficient effectually to cultivate and carry it on, I have taken in the joint Aſſiſtance of *other Hands*, and ſuper-added, to my own, all ſuch *Relations* as I could procure from Perſons whoſe Judgment and Fidelity might ſafely be relyed upon, about the Sea, Lakes, Rivers, Springs, and Rain, not only of this Iſland, but many other Parts of the World beſides. Nor do I neglect thoſe which are already extant in the *Publiſhed Diſcourſes* of diligent and inquiſitive Men.

From all which Obſervations, joyned with thoſe made by my ſelf, I prove,

1. That there is a mighty *Collection of Water* incloſed in the *Bowels of the Earth*, conſtituting an *huge Orb* in the interiour or central Parts of it; upon the Surface of which Orb of Water the terreſtrial *Strata* are expanded. That this is the ſame which *Moſes* calls the *Great Deep*, or *Abyſs*: the ancient Gentile Writers, *Erebus*, and *Tartarus*.

2. That the Water of this Orb *communicates* with that of the *Ocean*, by means of certain Hiatus's or Chaſmes paſſing betwixt it and the bottom of the Ocean. That they have the ſame common Center, around which the Water of

both of them is compiled and arranged; but in ſuch manner, that the ordinary Surface of this Orb is not level with that of the Ocean, nor at ſo great a diſtance from the Center as that is, it being for the moſt part reſtrained and depreſſed by the *Strata* of Earth lying upon it; but whereever thoſe *Strata* are broken, or ſo lax and poroſe that Water can pervade them, there the Water of the ſaid Orb does aſcend: fills up all the Fiſſures whereinto it can get Admiſſion or Entrance: and ſaturates all the Interſtices and Pores of the Earth, Stone, or other Matter, all round the Globe, quite up to the *level* of the Surface of the Ocean.

3. That there is a perpetual and inceſſant *Circulation* of *Water* in the *Atmoſphere*: it ariſing from the Globe in form of *Vapour*, and falling down again in *Rain*, *Dew*, *Hail*, and *Snow*. That the quantity of Water thus riſing and falling is *equal*; as much returning back in Rain, *&c.* to the whole terraqueous Globe, as was exhaled from it in Vapours: and reciprocally as much mounting up again in Vapour as was diſcharged down in Rain. That tho' the quantity of Water thus riſing and

falling be nearly certain and conſtant as to the *whole*, yet it varies in the ſeveral *Parts* of the Globe; by reaſon that the Vapours float in the Atmoſphere, ſailing in Clouds from place to place, and are not reſtored down again in a Perpendicular upon the *ſame* preciſe Tract of Land, or Sea, or both together, from which Originally they aroſe, but *any other* indifferently; ſo that ſome Regions receive back more in Rain than they ſend up in Vapour: as, on the contrary, others ſend up more in Vapour than they receive in Rain: nay, the very ſame Region at *one Seaſon* ſends up more in Vapours than it receives in Rain, and at *another* receives more in Rain than it ſends up in Vapour; but the Exceſſes of one Region and Seaſon compenſating the Defects of the others, the quantity *riſing* and *falling* upon the *whole* Globe is equal, however different it may be in the ſeveral *Parts* of it.

That the Rain which falls upon the Surface of the Earth partly runs off into *Rivers*, and thence into the *Sea*: and partly *ſinks* down into the Earth, inſinuating it ſelf into the Interſtices of the Sand, Gravel, or other Matter of the 4.

exteriour or uppermoſt *Strata*; whence *ſome of it* paſſes on into *Wells*, and into *Grotts*, and ſtagnates there, till 'tis by degrees again exhaled: *ſome of it* glides into the perpendicular Intervalls of the ſolid *Strata*; where, if there be no *Outlet* or Paſſage to the Surface, it ſtagnates, as the other: but if there be ſuch Outlets, 'tis by them refunded forth together with the ordinary Water of *Springs* and *Rivers*: and *the reſt*, which, by reaſon of the compactneſs of the terreſtrial Matter underneath, cannot make its way to Wells, the perpendicular Fiſſures, or the like *Exits*, only ſaturates the uppermoſt *Strata*: and in time remounts up again in Vapour into the Atmoſphere.

5. That although *Rains* do thus fall into, and augment *Springs* and *Rivers*, yet neither *the one* nor *the other* do derive the Water, which they ordinarily refund, from *Rains*; notwithſtanding what very many Learned Men have believed.

6. That *Springs* and *Rivers* do not proceed from *Vapours* raiſed out of the *Sea* by the Sun, borne thence by *Winds* unto *Mountains*, and there condenſed, as a modern ingenious Writer is of Opinion.

That the abovementioned great ſubterranean Magazine the *Abyſs*, with its Partner the *Ocean*, is the *Standing Fund* and *Promptuary* which ſupplies Water to the Surface of the Earth: as well *Springs* and *Rivers*, as *Vapours* and *Rain*. 7.

That there is a nearly uniform and conſtant Fire or *Heat*‖ diſſeminated throughout the Body of the Earth, and eſpecially the interiour Parts of it; the bottoms of the deeper Mines being very *ſultry*, and the Stone and Ores there very ſenſibly *hot* even in Winter, and the colder Seaſons. That 'tis *this Heat* which evaporates and elevates the Water of the Abyſs, buoying it up indifferently on every ſide, and towards all parts of the Surface of the Globe: pervading not only the Fiſſures and Intervals of the *Strata*, but the very *Bodies* of the *Strata* themſelves, *permeating* the Interſtices of the Sand, Earth, or other Matter, whereof they conſiſt: yea even the moſt firm and denſe 8.

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‖ Heat *and* Fire *differ but in* degree: *and Heat is Fire only in leſſer quantity. Fire I ſhall ſhew to be a Fluid conſiſting of Parts extremely ſmall and light, and conſequently very ſubtile, active, and ſuſceptive of Motion. An* Aggregate *of theſe Parts in ſuch* number *as to be* viſible *to the Eye, is what we call* Flame *and* Fire: *a leſſer, thinner, and more diſpers'd Collection,* Heat and Warmth.

denſe Marble and Sand-ſtone; for theſe give Admiſſion to it, though in leſſer quantity, and are always found ſaturated with it; which is the reaſon that they are ſofter, and cut much more eaſily, when firſt taken out of their Beds and Quarries, than afterwards, when they have lain ſome time expoſed to the Air, and that Humidity is evaporated.

That this *Vapour* proceeds up directly towards the Surface of the Globe on all ſides, and, as near as poſſible, in right Lines, unleſs impeded and diverted by the Interpoſition of *Strata* of Marble, the denſer ſorts of Stone, or other like Matter, which is ſo cloſe and compact that it can admit it only in ſmaller quantity, and this very ſlowly and leiſurely too.

That, when it is thus *intercepted* in its paſſage, the *Vapour*, which cannot penetrate the *Stratum* diametrically, *ſome of it* glides along the lower Surface of it, permeating the horizontal Interval which is betwixt the ſaid denſe *Stratum* and that which lies underneath it: *the reſt* paſſing the Interſtices of the Maſs of the ſubjacent *Strata*, whether they be of laxer Stone, of Sand, of

Marle, or the like, with a Direction parallel to the Site of thoſe *Strata*, till it arrives at their perpendicular Intervalls.

That the Water being thus approach'd to theſe *Intervalls*, in caſe the *Strata*, whereby the aſcending Vapour was collected and condenſed into Water (as we uſually ſpeak) in like manner as by an Alembick, happen to be raiſed above the *level* of the Earth's ordinary Surface, as thoſe *Strata* are whereof Mountains conſiſt, then the Water, being likewiſe got above the ſaid *level*, *flows forth* of thoſe Intervalls or Apertures, and, if there be no Obſtacle without, forms *Brooks* and *Rivers*: but where the *Strata*, which ſo condenſe it, are not higher than the mean Surface of the Earth, it ſtagnates at the Apertures, and only forms *Standing-Springs*.

That though the Supply from this great Receptacle below be *continual*, and nearly the *ſame* at all *Seaſons*, and *alike* to all *parts* of the Globe, yet when it arrives at or near the *Surface of the Earth*, where the *Heat* (the Agent which evaporates and bears it up) is *not ſo conſtant* and uniform as is that reſident *within* the Globe, but is ſubject to Viciſſitudes and Alterations, being at certain Seaſons greater than at others: being alſo greater in ſome Climates and Parts of the Earth than in others: it thence happens that the quantity of *Water at the Surface* of the Earth, though ſent up from the Abyſs with an almoſt conſtant Equality, is *various and uncertain*, as is the Heat there; at *ſome Seaſons*, and in *ſome Countries*, the Surface *abounding*, and being even drowned with the plenty of it, the *Springs full*, and the *Rivers high*: at *other Seaſons*, and in *other Countries* both *Springs and Rivers exceeding low*, yea ſometimes *totally failing*.

That when the *Heat* in the *exteriour Parts* of the Earth, and in the ambient Air, is as intenſe as that in the *interiour* Parts of it, all *that Water* which paſſes the Strata *directly*, mounting up in ſeparate Parcels, or in form of *Vapour*, does *not ſtop* at the Surface, becauſe the Heat *there* is *equal* both in quantity and power to *that* underneath, which brought it out of the Abyſs. This Heat therefore takes it here, and *bears it up*, part of it immediately out at the Surface of the Earth: the reſt, through the Tubes and Veſſels of the Vegetables which grow thereon, Herbs, Shrubs, and Trees, and along with a ſort of vegetative terreſtrial Matter, which it detaches from out the uppermoſt *Stratum* wherein theſe are planted; this it depoſes in them, for their Nutriment, as it paſſes through them †; and iſſuing out at the tops and extremities of them, it marches ſtill on, and is *elevated* up into the *Atmoſphere* to ſuch height that, the *Heat* being there *leſs*, it becomes *condenſed*, unites and combines into ſmall Maſſes or Drops, and at length falls down again in *Rain*, *Dew*, *Hail*, or *Snow*. And for the *other part* of the *Water*, which was condenſed at the Surface of the Earth, and ſent forth collectively into *Standing-Springs* and *Rivers*, *this* alſo ſuſtains a *Diminution* from the *Heat* above, being *evaporated*, more or leſs, in proportion to the greater or leſſer *Intenſeneſs* of the Heat, and the greater or leſſer *Extent* of the Surface of the Water ſo ſent forth.

That as theſe *Evaporations* are at *ſome times greater*, according to the *greater heat* of the *Sun*, ſo wherever they alight

† *Vid. Conſ.* 10. *infra.*

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alight again in *Rain*, 'tis as much ſuperiour in *quantity* to the Rain of *colder Seaſons*, as the *Suns power* is *then* ſuperiour to its power in *thoſe* Seaſons. This is apparent even in theſe *Northern Climes*, where the Suns power is never very great, our Rains in *June*, *July*, and *Auguſt*, being much greater than thoſe of the colder Months: the Drops larger, and conſequently heavier: falling thicker, faſter, and with greater force: ſtriking the ground, at their fall, with violence, and making a mighty noiſe: beating down the fruit from the Trees, proſtrating and laying Corn growing in the Fields: and ſometimes ſo filling the Rivers as to make them out-ſwell their Banks, and lay the neighbouring Grounds under Water. But much more apparent is it in the more *Southern Regions*: in *Abaſſinia*, *Nigritia*, *Guinea*: in the *Eaſt-Indies*: in *Braſil*, *Paraguay*, and other Countries of *South America*, to inſtance in no more. In theſe the Sun ſhews a much greater force: and their Rains (which are periodical, happening always much about the ſame time, and laſting ſeveral Months) fall in ſuch quantities as to be more like Rivers deſcending; than Showers; and by *theſe* are cauſed thoſe mighty *periodical Inundations* of the *Nile*, the *Niger*, the *Rio da Volta*: the *Ganges*: the *Rio de los Amazonas*, the *Rio de la Plata*, and other Rivers of thoſe Countries; to which *Inundations Egypt*, through which the *Nile* flows, the *Indies*, and the reſt, owe their *extraordinary Fertility*, and thoſe *mighty Crops* they produce after theſe Waters are withdrawn from off their Fields; *Rain-water*, as we have already noted *, carrying along with it a ſort of terreſtrial Matter that fertilizes the Land, as being proper for the Formation of Vegetables. * Pag. 47.

That, when the *Heat* in the exteriour Parts of the Earth, and in the ambient Air, is *leſs* than that in the interiour, the *Evaporations* are likewiſe *leſs*; and the *Springs* and *Rivers* thereupon do not only *ceaſe* to be *diminiſhed* †, proportionably to the *Relaxation* of the *Heat*, but are much *augmented*; a great part of the Water, which aſcends to the Surface of the Earth in *Vapour*, *ſtopping there*, for *want of Heat* to mount it thence up into the Atmoſphere, and *ſaturating* the ſuperficial † Conf. pag. 125.

or uppermoſt *Strata* with *Water*; which by degrees *drains* down into *Wells*, *Springs*, and *Rivers*, and ſo makes an Addition unto them. And this is the reaſon that *theſe abound with Water* in the *colder Seaſon* ſo much more than they do in the *hotter*.

9. That the *Water*, which is thus diſpens'd to the *Earth* and *Atmoſphere* by the *Great Abyſs*, being carried down by *Rains* and by *Rivers* into the *Ocean*, which, as we have ſaid, communicates, and ſtands at an *Æquilibrium* with that ſubterranean Conſervatory, is by that means reſtored back to the Abyſs; whence it returns again, in a continual *Circulation*, to the Surface of the Earth, in *Vapours*, and *Springs*.

10. That the *final Cauſe* of this Diſtribution of Water, in ſuch quantity, to all parts of the Earth indifferently in Springs, Rivers, and Rain: and of this *perpetual Circulation* and Motion of it, is the *Propagation of Bodies*, *Animals*, *Vegetables*, and *Minerals*, in a continued Succeſſion. That for Animals, they either feed upon Vegetables immediately: or, which comes to the ſame at laſt, upon other Animals which have fed upon them; ſo that *Vegetables*

*bles* are the firſt and *main Fund*, and fit *Matter* being ſupplied unto *theſe*, *Proviſion* is thereby made for the *Nouriſhment* of *Animals*; *theſe* Vegetables being no other than ſo many *Machines* ſerving to derive that *Matter* from the *Earth*, to digeſt and prepare it, for *their food*, leiſurely and by little and little, as they can admit and diſpoſe of it, and as it is brought to them by the Miniſtration of *this Fluid.* That Vegetables being naturally fix'd and tyed always to the ſame place, and ſo not able (as Animals are) to ſhift, and ſeek out after Matter proper for their Increment, 'twas indiſpenſably neceſſary that it ſhould be *brought to them*: and that there ſhould be ſome Agent, thus ready and at hand in all places, to do them that Office, and ſo carry on this great and important Work. For this Matter being impotent, ſluggiſh, and inactive, hath no more power to ſtir, or move it ſelf to *theſe Bodies*, than they themſelves have to move unto it; and therefore it muſt have lain eternally confined to its Beds of Earth, and then none of theſe Bodies could ever have been formed, were there not this, or the like, Agent to educe it thence, and bear it unto them. Nor does the *Water*, thus hurried about from place to place, ſerve only to *carry the Matter* unto theſe Bodies, but the parts of it being very voluble and lubricous, as well as fine and ſmall, it eaſily inſinuates it ſelf into, and placidly diſtends the Tubes and Veſſels of Vegetables, and by that means *introduces* into them the Matter it bears along with it, conveying it to the ſeveral Parts of them; where each Part, by a particular Mechaniſm in the Structure of it, detaches and aſſumes thoſe Particles of the Maſs ſo conveyed which are proper for the Nutrition and Augmentation of *that Part*, incorporating theſe with it, and letting all the reſt paſs on with the Fluid; thoſe Particles which are either ſuperfluous, and more than the parts of the Plant can admit and manage at one time: or that are not ſuitable and proper for the Nouriſhment of any of the parts of a Plant of that kind; paſſing out at the Extremities of it along with the Water *. And this latter Office it does likewiſe to Animals; Water, and other Fluids, ſerving to *convey the Matter*, whereby they are *nouriſhed*, from their Stomachs and Guts,

* *Confer. pag.* 125.

Guts, through the *Lacteals* and other finer Veſſels, to the ſeveral parts of their Bodies. But the Formation of Animals and Vegetables, being a thing ſomewhat foreign to my preſent purpoſe, I ſhall adjourn the fuller Conſideration of it to another Occaſion. How far Water is concerned in the Formation of *Minerals*, will appear more at large in the ſucceeding Part of this Work.

11. That 'tis this *Vapour*, or *ſubtile Fluid*, that aſcending thus inceſſantly out of the Abyſs, and *pervading the Strata* of Gravel, Sand, Earth, Stone, and the reſt, by degrees *rots* and decays the *Bones*, *Shells*, *Teeth*, and other parts of Animals: as alſo the *Trees*, and other Vegetables, which were lodged in thoſe *Strata* at the *Deluge* †; this Fluid, by its continual Attrition as it paſſes ſucceſſively by them, fretting the ſaid Bodies, by little and little wearing off and diſſipating their conſtituent Corpuſcles, and at length quite diſſolving and deſtroying their Texture. That yet it hath not this Effect indifferently upon all of them; thoſe which happened to be repoſed in the firmer and compacter *Strata*, e. g. of Marble, the cloſer kinds of Sand-ſtone, Chalk, and the

† *Part* 2. *Conſ.* 3.

the like, being thereby protected in great meaſure from its Attacks; it paſſing through theſe only in leſſer quantity, and that ſlowly and with difficulty [*]; ſo that its Motion *here* being more feeble and languid, the Shells and other Bodies encloſed *in theſe* are uſually found very *firm* and *entire*, many of them retaining even their natural Colours to this day, though they have lain thus above four thouſand years; and may doubtleſs endure much longer, even as long as thoſe *Strata*, to which they owe their Preſervation, ſhall themſelves endure, and continue entire and undiſturbed: whilſt thoſe which were lodged in Marle, Sand, Gravel, and the like, more *looſe* and *pervious* Matter, are ſo *rotted* and *decayed*, that they are now not at all, or very difficultly, diſtinguiſhable from the Marle, or other Matter in which they lye. Not but that there are ſometimes found, even in theſe laxer *Strata*, Shells, Teeth, and other Bodies that are ſtill tolerably firm, and that have eſcaped pretty ſafe; but theſe are only ſuch as are of a more than ordinary *robuſt* and durable Conſtitution, whereby they were enabled the better to with-

[*] *Vid. Conſ.* 8. *ſupra.*

withſtand the repeated Aſſaults of the permeating Fluid, and to maintain their Integrity, whilſt the other tenderer kinds periſh'd and were deſtroyed.

That this ſame ſubtile Fluid exerts the ſame power upon the Surface of the Earth, that it does in the Bowels of it: and as it is inſtrumental to the *Formation* of Bodies here*, ſo is it likewiſe (by a different Operation, which I have not room to deſcribe in this place) of the *Deſtruction* of them; and that Corroſion and Diſſolution of Bodies, even the moſt ſolid and durable, which is vulgarly aſcrib'd to the *Air*, is cauſed meerly by the *Action* of *this Matter* upon them; the Air being ſo far from injuring and preying upon the Bodies it environs, that it contributes to their Security and Preſervation, by impeding and obſtructing the Action of this Matter: and were it not for the Interpoſition of the Air, they could never be able to make ſo long and vigorous Reſiſtance as now they do.

12. That this *Subterranean Heat* or Fire, which thus elevates the Water out of the *Abyſs*, being in any part of the Earth *ſtop'd*, and ſo diverted from its ordi-

* *Confer. Conſ.* 10. *ſupra.*

ordinary courſe, by ſome accidental Glut or Obſtruction in the Pores or Paſſages through which it uſed to aſcend to the Surface: and being by that means preternaturally aſſembled, in greater quantity than uſual, into one place, it cauſes a great Rarifaction and Intumeſcence of the Water of the Abyſs, putting it into very great *Commotions* and Diſorders: and at the ſame time making the like Effort upon the *Earth*, which is expanded upon the face of the Abyſs, it occaſions that Agitation and Concuſſion of it, which we call an *Earthquake*.

That this *Effort* is in ſome Earthquakes ſo *vehement* that it ſplits and tears the Earth, making Cracks or *Chaſmes* in it ſome Miles in length, which open at the inſtants of the Shocks, and cloſe again in the Intervalls betwixt them: nay, 'tis ſometimes ſo extremely violent, that it plainly *forces* the ſuperincumbent *Strata*; breaks them all throughout, and thereby perfectly *undermines* and ruins the Foundations of them; ſo that theſe failing, *the whole Tract*, aſſoon as ever the Shock is over, *ſinks* down to rights into the *Abyſs* underneath, and is ſwallowed up by it, the Water thereof immediately riſing up, and forming a Lake in the place where the ſaid Tract before was. That ſeveral conſiderable Tracts of Land, and ſome with Cities and Towns ſtanding upon them: as alſo whole Mountains, many of them very large, and of a great height, have been thus totally *ſwallowed up.*

That this Effort being made in *all Directions* indifferently: upwards, downwards, and on every ſide; the Fire dilating and expanding on all hands, and endeavouring, proportionably to the quantity and ſtrength of it, to get room, and make its way through all Obſtacles, falls as foul upon the *Water of the Abyſs* beneath, as upon the Earth above; *forcing it forth* which way ſoever it can find vent or paſſage: as well through its ordinary Exits, Wells, Springs, and the Outlets of Rivers: as through the Chaſmes then newly opened: through the *Camini* or Spiracles of *Ætna*, or other near *Vulcanoes*: and thoſe *Hiatus*'s at the bottom of the Sea †, whereby the Abyſs below opens into it, and communicates with it.

† *Vid.* Conſ. 2. ſupra.

That as the Water reſident in the Abyſs is, in *all Parts* of it, ſtored with a conſiderable quantity of Heat, and more eſpecially in *thoſe* where theſe extraordinary Aggregations of this Fire happen; ſo likewiſe is the Water which is thus forced out of it; inſomuch that, when thrown forth, and mix'd with the Waters of Wells, of Springs, of Rivers, and the Sea, it renders them very ſenſibly hot.

That it is uſually expelled forth in *vaſt quantities*, and with *great Impetuoſity*; inſomuch that it hath been ſeen to ſpout up out of deep Wells, and fly forth, at the tops of them, upon the face of the ground. With like rapidity comes it out of the Sources of Rivers, filling them ſo of a ſudden as to make them run over their Banks, and overflow the neighbouring Territories, without ſo much as one drop of Rain falling into them, or any other concurrent Water to raiſe and augment them. That it ſpues out of the Chaſmes, opened by the Earthquake, in great abundance: mounting up, in mighty *Streams*, to an incredible *height* in the Air, and this oftentimes at many Miles diſtance from any Sea. That it likewiſe flies forth of the *Volcanoes* in *vaſt floods*, and with wonderful *violence*. That 'tis forced through the *Hiatus*'s at the bottom of the *Sea* with ſuch vehemence, that it puts the Sea immediately into the moſt horrible Diſorder and Perturbation imaginable, even when there is not the leaſt breath of Wind ſtirring, but all, till then, calm and ſtill: making it rage and roar with a moſt hideous and amazing Noiſe: raiſing its Surface into prodigious Waves, and toſſing and rowling them about in a very ſtrange and furious manner: overſetting Ships in the Harbours, and ſinking them to the bottom, with many other like Outrages. That 'tis refunded out of theſe *Hiatus*'s in ſuch *quantity* alſo that it makes a vaſt Addition to the Water of the Sea: *raiſing* it many Fathoms higher than ever it flows in the higheſt Tides, ſo as to pour it forth far beyond its uſual *Bounds*, and make it overwhelm the adjacent Country; by this means ruining and deſtroying Towns and Cities: drowning both Men and Cattel: breaking the Cables of Ships, driving them from their Anchors, bearing them along with the Inundation ſeveral

Miles up into the Country, and there running them a-ground: ſtranding Whales likewiſe, and other great Fiſhes, and leaving them, at its Return, upon dry Land.

That theſe *Phænomena* are not new, or peculiar to the Earthquakes which have happened in our times, but have been obſerved in *all Ages*, and particularly theſe exorbitant Commotions of the Water of the Globe. This we may learn abundantly from the Hiſtories of former Times: and 'twas for this Reaſon that many of the Ancients concluded, rightly enough, that *they* were cauſed by the Impulſes and Fluctuation of Water in the Bowels of the Earth; and therefore they very frequently called *Neptune* Σεισίχθων, as alſo Ἐνοσίχθων, Ἐνοσίγαιος, and Τινάκτωρ γαίης; by all which Epithets they denoted his Power of *Shaking the Earth.* They ſuppoſed that he preſided over all Water whatever, as well that within the Earth, as the Sea, and the reſt upon it: and that the Earth was ſupported by Water, its Foundations being laid thereon; on which account it was that they beſtowed upon him the Cognomen Γαιήοχος, or *Supporter of the Earth*, and that of Θεμελιȣ̃χος, or *The Suſtainer of its Foundations.* They likewiſe believed that he, having a full Sway and Command over the Water, had Power to ſtill and compoſe it, as well as to move and diſturb it, and the Earth, by means of it; and therefore they alſo gave him the Name of Ἀσφάλιος, or *The Eſtabliſher*; under which Name ſeveral Temples were conſecrated to him, and Sacrifices offered whenever an Earthquake happened, to pacifie and to appeaſe him; requeſting that he would allay the Commotions of the Water, ſecure the Foundations of the Earth, and put an end to the Earthquake.

That the *Fire* it ſelf, which, being thus aſſembled and pent up, is the Cauſe of all theſe Perturbations, makes its own way alſo forth, by what Paſſages ſoever it can get vent: through the Spiracles of the next *Vulcano* ||: through the *Cracks* and Openings of the Earth above-mentioned: through the Apertures of *Springs*, eſpecially thoſe of the *Thermæ* †: or any other way that it can either find or make; and being thus diſcharged, the Earthquake ceaſeth, till the *Cauſe* returns again, and a freſh

|| *Conf. Conſect.* 13. *infra.*

† *Vid. Conf.* 14. *infra.*

a freſh Collection of this *Fire* commits the ſame Outrages as before.

That there is ſometimes in Commotion a Portion of the Abyſs of that *vaſt Extent*, as to ſhake the Earth incumbent upon it for ſo very large a part of the Globe together, that the Shock is felt the ſame Minute preciſely in Countries that are many hundreds of Miles diſtant from each other, and this even though they happen to be parted by the Sea lying betwixt them: nay, there want not Inſtances of ſuch an univerſal *Concuſſion of the whole Globe* as muſt needs imply an Agitation of the *whole Abyſs*.

That though the Abyſs be liable to theſe Commotions in all parts of it, and therefore no Country can be wholly exempted from the Effects of them; yet theſe Effects are no where very remarkable, nor are there uſually any great damages done by Earthquakes, except only in thoſe Countries which are *mountainous*, and conſequently *ſtoney*, and *cavernous* underneath *; and eſpecially where the Diſpoſition of the *Strata* is ſuch that thoſe Caverns open into the Abyſs, and ſo freely admit and entertain the Fire, which aſſembling

* *Vid. Part 2. Conſ. 8.*

bling therein, is the Cauſe of the Shock, it naturally ſteering its courſe that way where it finds the readieſt Reception, which is towards theſe Caverns; this being indeed much the caſe of *Damps* in Mines, whereof more by and by. Beſides that thoſe Parts of the Earth which abound with *Strata* of Stone, or Marble, making the ſtrongeſt Oppoſition to this Effort, are the moſt furiouſly ſhattered, and ſuffer much more by it than thoſe which conſiſt of Gravel, Sand, and the like laxer Matter, which more eaſily give way, and make not ſo great reſiſtance; an Event obſervable not only in this, but all other Exploſions whatever. But above all, thoſe *Countries*, which yeild great ſtore of *Sulphur* and *Nitre*, are by far the moſt injured and incommoded by Earthquakes; theſe Minerals conſtituting in the Earth a kind of Natural Gunpowder, which, taking fire, upon this aſſembly and approach of it, occaſions that murmuring noiſe, that ſubterranean Thunder (if I may ſo ſpeak) which is heard rumbling in the bowels of the Earth during Earthquakes, and, by the aſſiſtance of its exploſive Power, renders the Shock much greater, ſo as ſometimes to make miſerable Havock and Deſtruction. And 'tis for this reaſon that *Italy*, *Sicily*, *Anatolia*, and ſome parts of *Greece* have been *ſo long* and *ſo often* alarmed and haraſſed by Earthquakes; theſe Countries being all Mountainous, and Cavernous, abounding with Stone and Marble, and affording Sulphur and Nitre in great Plenty. But for a more particular Hiſtory of the ſeveral *Phænomena* which precede, which accompany, and which follow after Earthquakes: for the Cauſes of thoſe *Phænomena*: and for a more exact Account of the Origine, and the Oeconomy of this ſubterranean Fire, I muſt beg the Reader's Patience till the larger Work be made publick.

13. That *Ætna*, *Veſuvius*, *Hecla*, and the other *Volcanoes*, are only ſo many *Spiracles*, ſerving for the *diſcharge* of this *ſubterranean Fire*, when 'tis thus preternaturally aſſembled. That where there happens to be ſuch a Structure and Conformation of the interiour Parts of the Earth as that the Fire may paſs freely and without impediment from the Caverns, wherein it aſſembles, unto theſe Spiracles, it then rea-

dily, and eaſily gets out, from time to time, without ſhaking or diſturbing the Earth; but where ſuch Communication is wanting, or the Paſſages not ſufficiently large and open, ſo that it cannot come at the ſaid Spiracles without firſt forcing and removing all Obſtacles, it heaves up and ſhocks the Earth, with greater or leſſer Impetuoſity, according as the quantity of the Fire thus aſſembled is greater or leſs, till it hath made its way to the Mouth of the *Vulcano*; where it ruſheth forth, ſometimes in mighty Flames, with great Velocity, and a terrible bellowing noiſe. That therefore there are ſcarcely any Countries, that are much annoyed with Earthquakes, that have not one of theſe Fiery Vents; and *theſe* are conſtantly all in Flames whenever any Earthquake happens; they diſgorging that Fire, which, whilſt underneath, was the cauſe of the Diſaſter; and were it not for theſe *Diverticula*, whereby it thus gains an *Exit*, 'twould rage in the Bowels of the Earth much more furiouſly, and make greater havock than now it doth. So that though thoſe Countries, where there are ſuch *Vulcano*'s, are uſually, more or leſs, troubled with Earthquakes; yet, were theſe *Vulcano's* wanting, they would be much more troubled with *them* than now they are: yea in all probability to that degree, as to render the Earth, for a vaſt ſpace around them, perfectly uninhabitable. In one word, ſo beneficial are *theſe* to the Territories where they are, that there do not want Inſtances of *ſome* which have been reſcued and wholly delivered from Earthquakes by the breaking forth of a new *Vulcano* there; this continually diſcharging that Matter, which, being till then barricaded up, and impriſoned in the Bowels of the Earth, was the occaſion of very great and frequent Calamities. That moſt of theſe Spiracles perpetually and at all Seaſons ſend forth Fire, more or leſs; and though it be ſometimes ſo little that the Eye cannot diſcern it, yet even then, by a nearer Approach of the Body, may be diſcovered a copious and very ſenſible Heat continually iſſuing out.

14. That the *Thermæ*, *Natural Baths*, or *Hot-Springs*, do not owe their Heat to any Colluctation or Effervesſcence of the Minerals in them, as ſome Naturaliſts

tants have believed: but to the beforemention'd *Subterranean Heat* or Fire. That theſe Baths continually emit a manifeſt and very ſenſible Heat: nay ſome of them have been obſerved at ſome times to ſend forth an actual and viſible Flame. That not only theſe, but all other Springs whatever, have in them ſome degree of Heat *, (none of them ever Freezing, no not in the longeſt and ſevereſt Froſts) but more eſpecially thoſe which ariſe where there is ſuch a Site and Diſpoſition of the *Strata* within the Earth as gives free and eaſie Admiſſion to this Heat, and favours its Aſcent to the Surface; where perſpiring forth at the ſame Outlets with the Water of the Spring, it by that means heats it, more or leſs, as it chanceth to be diſpenſed forth in greater or leſſer quantity. That as the Heat of all Springs is owing to this ſubterraneous Fire, ſo wherever there are any extraordinary Diſcharges of this Fire, there alſo are the neighbouring Springs hotter than ordinary; witneſs the many Hot-Springs near *Ætna*, *Veſuvius*, *Hecla*, and all other *Vulcanoes*. That the Heat of the *Thermæ* is not conſtant, and always alike; the

* *It is indeed by this very heat that their Water is borne unto them from out the Abyſs.* Vid. *Conſ.* 8. ſupra.

ſame Spring ſuffering at ſome times a very manifeſt Failure and Remiſſion of its Heat: at others as manifeſt an Addition and Encreaſe of it; yea ſometimes to that Exceſs as to make it boil and bubble with extream Heat, like Water when boyling over a common Fire. That particularly during Earth-
† *Vid. Conſ.* 12. and 13. ſupra. quakes, and Eruptions of *Vulcano's* †, when there is a more copious Acceſſion of this ſubterraneous Fire, the *Thermæ* all thereabouts become much hotter than before: yeilding alſo a far greater ſupply of Water than they were wont to do: and a murmuring Noiſe is uſually heard, below them, in the Bowels of the Earth; all which is occaſioned meerly by the then rapid Motion, and Aſcent of the Fire, in greater plenty than before, to the Apertures of theſe Springs.

I have now finiſh'd the Account of this Section: and was juſt going to take off my hand here; but recollecting that in the foregoing Part of this
‖ *Pag.* 96. Work ‖ I promiſed ſome further *Proofs* of *Contrivance* in the Structure of the Globe we dwell upon: and ſuch too as may ſatisfie any fair and unbyaſs'd Spectator that the framing and Compoſition

poſition of it out of the Materials of the former Earth was a work of Counſel and Sagacity: a Work apparently above the higheſt reaches of Chance, or the Powers of Nature; and this being a proper place wherein to produce thoſe Proofs, I ſhall give ſuch Hints of them as the Brevity I am tyed up to will permit me, and then concluſe.

I am indeed well aware that the Author of the *Theory of the Earth* * differs very much from me in Opinion as to this matter. He will not allow that there are any ſuch Signs of Art and Skill in the Make of the Preſent Globe as are here mentioned: or that there was ſo great Care, and ſuch exact Meaſures taken in the re-fitting of it up again at the Deluge. He reckons it no other than an huge diſorderly Pile of *Ruines and Rubbiſh*: and is very unwilling to believe that it was the Product of any Reaſoning or Deſigning Agent. The Chanel of the Ocean appears to him *the moſt ghaſtly thing in Nature*, and he *cannot at all admire its beauty or elegancy: for 'tis*, in his judgment, *as deformed and irregular as it is great*. And for the Caverns of the Earth, the Fiſſures and Breaches of the

* *Lib.* 1. *c.* 9. *to* 12.

*Strata*, he cannot fancy that they were formed *by any work of Nature, nor by any immediate Action of God, ſeeing there is neither uſe*, that he can diſcover, *nor beauty in this kind of Conſtruction.* Then for the Mountains, *theſe*, he ſays, *are placed in no order one with another, that can either reſpect Uſe or Beauty, and do not conſiſt of any proportion of Parts that is referable to any Deſign, or that hath the leaſt footſteps of Art or Counſel.* In fine, he thinks there are ſeveral things in the Terraqueous Globe that are *rude and unſeemly*: and many that are *ſuperfluous.* He looks upon it as *incommodious*, and *as a broken and confuſed heap of Bodies, placed in no order to one another, nor with any correſpondency or regularity of Parts*: and it ſeems to him nothing better than a *rude Lump*, and a *little dirty Planet.* I have given his Opinion in his own Words, though I have upon all like Occaſions taken a ſhorter Courſe, and contented my ſelf with giving only the ſenſe of others; but this I have done here, leaſt any Man ſhould ſuſpect that I miſtake the Author's Sentiments, or do not repreſent them fairly.

Now though it were really ſo, that there were ſome ſuch Eye-ſores in our Earth as are here ſuggeſted: and that we could not preſently find out all the Gayeties and Embeliſhments that we might look for in it, the matter would not be great; and we might very well be contented to take it as we find it. But after all the thing is in truth quite otherwiſe, and there are none of all theſe wanting: nor any ſuch Deformities as are here imagined; but, on the contrary, ſo very many real Graces and Beauties, that 'tis no eaſie thing to overlook them all. Even this very variety of Sea and Land, of Hill and Dale, which is here reputed ſo inelegant and unbecoming, is indeed extreamly charming and agreeable. Nor do I offer this as any private Fancy of my own, but as the common Senſe of Mankind, who are the true and proper Judges in the Caſe, both the Ancients and Moderns, giving their Suffrages unanimouſly herein; and even the Heathens themſelves, have eſteemed this variety not only ornamental to the Earth, but a Proof of the Wiſdom of the Creator of it, and alledged it as ſuch: whereof more in due place.

And, as I cannot admit that there is any thing unhandſome or irregular: ſo much leſs can I grant that there is any thing incommodious and Artleſs, or uſeleſs and Superfluous, in the Globe. Were I at full Liberty to do it here, 'twould be no hard thing to make appear that there are no real Grounds for any ſuch Charge. For how eaſie were it, by taking a minute and diſtinct Survey of the Globe, and of the very many and various Limbs and Parts of it, to ſhew that all theſe are ordered and digeſted with infinite Exactneſs and Artifice; each in ſuch manner as may beſt ſerve to its own proper End, and to the uſe of the whole? How eaſie were it to ſhew, that the Rocks, the Mountains, and the Caverns, againſt which theſe Exceptions are made, are of indiſpenſible Uſe and Neceſſity, as well to the Earth, as to Man and other Animals, and even to all the reſt of its Productions? That there are no ſuch Blemiſhes, no Defects: nothing that might have been altered for the better: nothing ſuperfluous: nothing uſeleſs, in all the whole Compoſition? and ſo finally trace out the numerous Footſteps and Marks of the Preſe[illegible] and

Interpoſition of a moſt wiſe and intelligent Architect throughout all this ſtupendous Fabrick? But I muſt reſerve *this* for the larger Work, and content myſelf for the preſent with only giving ſome brief Hints of it in the following Propoſitions. Namely,

That 'twas abſolutely neceſſary for the well-being both of the Earth it ſelf, and of all terreſtrial Bodies, that ſome of the *Strata* ſhould conſolidate, as they did, immediately after the Subſidence of their Matter at the Deluge: that *theſe* ſhould afterwards be broken in certain places: and laſtly, that they ſhould be diſlocated, ſome of them elevated, and others depreſſed.

That had not the *Strata* of Stone and Marble become ſolid *, but the Sand, or other Matter whereof they conſiſt, continued lax and incoherent, and they conſequently been as pervious as thoſe of Marle, Gravel, and the like, the Water which riſes out of the Abyſs, for the Supply of Springs and Rivers, would not have ſtop'd at the Surface of the Earth, but march'd directly, and without impediment, up into the Atmoſphere, in all parts of the Globe wherever there was Heat enough in

*As *Part* 2. *Conſ.* 4.

the Air to continue its Aſcent, and buoy it up; ſo that there then muſt needs have been an univerſal failure and want of Springs and Rivers all the Summer-Seaſon, in the colder Climes: and all the Year round in the hotteſt, and thoſe that are near the *Æquator*, where there is much the greateſt need of both the one and the other; and this meerly for want of the Interpoſition of ſuch denſe and ſolid *Strata*, to arreſt the aſcending Vapour to ſtop it at the Surface of the Earth: and to collect and condenſe it there.

That though the *Strata* had become ſolid, ſo as to have condenſed the riſing Vapour, yet if they had not been broken alſo, || the Water muſt have lain eternally underneath thoſe *Strata*, without ever coming forth; ſo that there then could have been neither Springs nor Rivers for a very conſiderable part, or indeed, almoſt the whole Earth; the Water, which ſupplies theſe, proceeding out at thoſe Breaches *. This Water therefore would have been wholly intercepted, all lock'd up within the Earth, and its Egreſs utterly debarr'd, had the *Strata* of Stone and Marble remained continuous, and

|| As *Part* 2. *Conſ.* 6.

* *Conſ.* 8. ſupra.

Interwithout ſuch Fiſſures and Interruptions. That theſe Fiſſures have a ſtill further uſe, and ſerve for Receptacles of Metalls, and of ſeveral ſorts of Minerals; which are arreſted by the Water in its paſſage thither through the *Strata* wherein the ſingle Corpuſcles of thoſe Metalls and Minerals were lodged †, and borne along with it into theſe Fiſſures; where, being by this means collected, they are kept in ſtore for the uſe of Mankind.

† Part 4. Conſ. 5.

That though there had been both *ſolid Strata* to have condens'd the aſcending Vapour: and *thoſe* ſo broken too as to have given free Vent and Iſſue to the Water ſo condenſed; yet had not the ſaid *Strata* been diſlocated likewiſe ‖: ſome of them elevated, and others depreſs'd, there would have been no Cavity or Chanel to give Reception to the Water of the Sea: no Rocks, Mountains, or other Inequalities in the Globe; and without theſe, the Water, which now ariſes out of it, muſt have all ſtagnated at the Surface, and could never poſſibly have been refunded forth upon the Earth: nor would there have been any Rivers, or running Streams, upon the face of the

‖ Part 2. Conſ. 6,7,8.

the whole Globe, had not the *Strata* been thus raiſed up, and the Hills exalted above the neighbouring Valleys and Plains; whereby the Heads and Sources of Rivers, which are in thoſe Hills, were alſo born up above the ordinary Level of the Earth, ſo as that they may flow upon a Deſcent, or an inclining Plane, without which they could not flow at all †.

† *Conſ. Conſ.* 8. ſupra.

That this Affair was not tranſacted unadviſedly, caſually, or at random: but with due Conduct, and juſt Meaſures. That the quantity of Matter conſolidated: the Number, Capacity, and Diſtances of the Fiſſures: the Situation, Magnitude, and Number of the Hills, for the condenſing, and diſcharging forth the Water; and, in a word, all other things were ſo ordered as that they might *beſt* conduce to the *End* whereunto they were *deſigned* and ordained: and ſuch proviſion made that a Country ſhould not want ſo many Springs and Rivers as were convenient and requiſite for it: nor, on the other hand, be over-run with them, and afford little or nothing elſe; but a Supply every where ready, ſuitable to the Neceſſities and Expences of each

Climate and Region of the Globe. For example, thoſe Countries which lye in the Torrid Zone, and under or near the *Line*, where the Heat is very great, are furniſhed with Mountains anſwerable: Mountains which both for Bigneſs and Number, ſurpaſs thoſe of colder Countries as much as the Heat there ſurpaſſes that of thoſe Countries. Witneſs the *Andes*, that prodigious Chain of Mountains in *South America*: *Atlas* in *Africa*: *Taurus* in *Aſia*: the *Alpes* and *Pyrenees* of *Europe*, to mention no more. By theſe is collected and diſpenſed forth a quantity of Water proportionable to the Heat of thoſe Parts; ſo that although, by reaſon of the Exceſs of this Heat there, the Evaporations from the Springs and Rivers are *very great*, yet they, being, by theſe larger Supplies, continually ſtock'd with an Exceſs of Water *as great*, yeild a Maſs of it for the uſe of Mankind, the Inhabitants of thoſe Parts, of the other Animals, and of Vegetables, not much, if at all, inferiour to the Springs and Rivers of colder Climates. That beſides this, the Waters thus evaporated and mounted up into the Air, thicken and cool it, and, by their Interpoſition betwixt the Earth, and the Sun, ſkreen and fence off the ardent Heat of it, which would be otherwiſe unſupportable: and are at laſt returned down again in copious and fruitful Showers to the ſcorched Earth; which, were it not for this remarkably Providential Contrivance of Things, would have been there perfectly uninhabitable: laboured under an eternal Drought: and have been continually parched and burnt.

To this former Section I ſhall add, by way of Appendix,

1. A Diſſertation concerning the *Flux and Reflux of the Sea*: and its other Natural *Motions*; with an Account of the *Cauſe* of thoſe *Motions*: as alſo of the *End* and *Vſe* of them: and an Enquiry touching the *Cauſe* of the *Ebbing* and *Flowing*, and ſome other uncommon *Phænomena* of certain *Springs*.
2. A Diſcourſe concerning the *Saltneſs* of the *Sea*.
3. A Diſcourſe concerning *Wind*: the *Origin*, and Uſe of it in the Natural World.

PART

## PART III. SECT. II.

### *Of the Univerſality of the Deluge. Of the Water which effected it. Together with ſome further Particulars concerning it.*

IN the precedent Section I conſider the preſent and natural State of the Fluids of the Globe. I ranſack the ſeveral Caverns of the Earth: and ſearch into the Storehouſes of Water; and this principally in order to find out where that mighty Maſs of Water which overflowed the whole Earth in the days of *Noah*, is now beſtowed and concealed: as alſo which way 'tis at this time uſeful to the Earth and its Productions, and ſerviceable to the preſent Purpoſes of Almighty Providence.

Such a Deluge as that which *Moſes* repreſents, whereby *All the high Hills that were under the whole Heaven were covered* †, would require a portentous quantity of Water; and Men of Curioſity, in all Ages, have been very much

† *Gen.* 7. 19.

much to ſeek what was become of it, or where it could ever find a Reſervatory capable of containing it. 'Tis true there have been ſeveral who have gone about to inform them, and ſet them to rights in this Matter ; but for want of that Knowledge of the preſent Syſtem of Nature : and that inſight into the Structure and Conſtitution of the Terraqueous Globe, which was neceſſary for ſuch an Undertaking, they have not given the Satisfaction that was expected. So far from it that the *greateſt part* of theſe, ſeeing no where Water enough to effect a *General* Deluge, were forced at laſt to mince the Matter, and make only a *Partial* one of it ; reſtraining it to one ſingle Country : to *Aſia*, or ſome leſſer portion of Land ; than which, nothing can be more contrary to the *Moſaick* Narrative.

For *the reſt*, they had recourſe to Shifts which were not much better ; and rather evaded than ſolved the Difficulty ; ſome of them imagining that a quantity of Water, ſufficient to make ſuch a Deluge, was created upon that Occaſion, and, when the buſineſs was done, all disbanded again and annihilated. Others ſuppoſed a Converſion of the Air and Atmoſphere into Water, to ſerve the turn. Many of them were for fetching down I know not what ſupercœleſtial Waters for the purpoſe. Others concluded that the Deluge roſe only fifteen Cubits above the Level of the Earth's ordinary Surface, covering the Valleys and Plains, but not the Mountains: all equally wide of Truth, and of the Mind of the Sacred Writer.

One of the laſt Undertakers of all ſeeing this, began to think the Cauſe deſperate; and therefore, in effect, gives it up. For conſidering how unſucceſsful the Attempts of thoſe who were gone before him had proved: and having himſelf || alſo *employed his laſt and utmoſt endeavours to find out Waters for the Vulgar Deluge*: having muſtered up all the Forces he could think of, and all too little: *The Clouds above, and the Deeps below, and in the bowels of the Earth*; *and theſe*, ſays he, *are all the Stores we have for Water, and Moſes directs us to no other for the Cauſes of the Deluge*: he prepares for a Surrender, aſſerting, from a miſtaken and defective Computation, that *all theſe* will not come up to near the quan-

|| *Theory of Earth*, l. 1. c. 2.

quantity requiſite: and that *in any known parts of the Univerſe, to find Water ſufficient for this effect, as it is generally explained and underſtood; is,* he thinks, *impoſſible:* that is, ſufficient to cauſe *a Deluge,* to uſe his own Words, *overflowing the whole Earth, the whole Circuit, and whole Extent of it, burying all in Water, even the greateſt Mountains:* which is, in plain terms, ſuch a one as was *explained and underſtood* by *Moſes,* and the Generality of Writers ſince.

Having therefore thus over-haſtily concluded that ſuch a Deluge was impoſſible: and that all Nature could not afford Water enough to drown the whole Globe, if of the Circuit and Extent that now it is: he flies to a new Expedient to ſolve the Matter, and ſuppoſes an Earth of a Make and Frame much like that imaginary one of the Famous Monſieur *Des Cartes* ‖, which he makes to fall all to pieces, at the Deluge, and to contract it ſelf into a leſſer room, that the Water might the better ſurround and encompaſs it.

‖ *Princ. Philoſ.* l. 4.

The ſober and better ſort of the Standers-by, and thoſe who were Well-wiſhers to *Moſes,* began to be under ſome Concern and Uneaſineſs to ſee him thus ſet aſide only to make way for a new Hypotheſis: and ſo ſerious and weighty a Matter, as is this Tradition of the Univerſal Deluge, plac'd after all upon ſo very unſteady a Bottom. But that Concern encreas'd when they further heard him ſo zealouſly decrying all former Notions of a Deluge: refuſing to grant one upon any Terms but his own: and ſo peremptorily declaring, *That all other ways aſſigned for the Explication of Noah's Flood are falſe or impoſſible.* This was to reduce the Thing to a very great Streight: and ſurely an expoſing and venturing of it a little too far. For if all the other Ways be falſe and impoſſible, ſhould this, the only one left, prove at laſt ſo likewiſe, the Opinion of a Deluge would be left very precarious and defenceleſs, and we might either believe or disbelieve it at pleaſure; nay the negative part would of the two have much the Advantage, there being no reaſonable Foundation to believe that the Deluge did come to paſs this way.

Some Men there are who have made a very untoward uſe of *this*, and ſuch a one that I am willing to perſuade my ſelf he never intended they ſhould; yet it were to have been wiſh'd that he had been ſomewhat more wary. Theſe cryed up this Computation of the Water as indiſputable and infallible: and then boldly gave out that ſuch a Deluge as that deſcribed by *Moſes* was altogether incredible, and that there never was nor could be any ſuch Thing. Nothing was talk'd of amongſt them under Mathematical Demonſtrations of the Falſhood of it; which they vented with all imaginable Triumph, and would needs have it that they had here ſprung a freſh and unanſwerable Argument againſt the Authentickneſs of the *Moſaick* Writings; which indeed is what they drive at, and a Point they very fain would gain.

For my part, my Subject does not neceſſarily oblige me to look after this Water: or to point forth the place whereinto 'tis now retreated. For when, from the Sea-ſhells, and other Remains of the Deluge, I ſhall have given undeniable Evidence that it did actually cover all Parts of the Earth, it muſt needs follow that there was then Water enough to do it, wherever it may be now hid, or whether it be ſtill in being or not. Yet the more effectually to put a ſtop to the Inſults and Detractions of theſe vain Men, I reſolved to enter a little farther into the Examination of this Matter; and that produced the former Section of this 3d Part; wherein I enquire what proportion the Water of the Globe bears to the Earthy Matter of it; and upon a moderate Eſtimate and Calculation of the Quantity of Water now actually contained in the Abyſs, I found that this alone was full enough, if brought out upon the Surface of the Earth, to cover the whole Globe to the height aſſigned by *Moſes*; which is, fifteen Cubits above the Tops of the higheſt Mountains*; the Particulars of which Calculation, ſhall be laid before the Reader at length in the *Larger Work*; for any one will eaſily ſee that there is ſo great an *Apparatus* of Things only previous, which muſt needs be adjuſted before I can come to the Calculation it ſelf, that to deſcend to Particulars *here*, further than I have already || done, would not only carry *this Diſcourſe* out beyond all reaſonable Bounds, and make the Parts of it diſproportionate

* Gen. vii. 20.

|| Conf. Sect. 1. Conf. 12.

to each other, but, which is not leſs to be thought of, would be an Anticipation of the *Other Work.*

This done, I again ſet aſide the Obſervations about the Fluids of the Globe, introduced upon this Occaſion in the other Section, as now of no further uſe: and reaſſume the Thread of the other Obſervations which I propoſe at the Beginning of this Work; and from them I ſhew,

1. That the *Deluge* was *Univerſal*, and laid the whole Earth under Water: covering all, even the higheſt, Mountains, quite round the Globe.

2. That at the time of the Deluge the Water of the *Ocean* was firſt born forth upon the Earth: That it was immediately ſucceeded by *that* of the *Abyſs*; which likewiſe was brought out upon the Surface of the Globe.

3. That upon the Diſruption of the *Strata*: and the Elevation of ſome, and Depreſſion of others of them, which followed after that Diſruption, towards the latter end of the Deluge †, this Maſs of Water fell back again into the depreſt and lower parts of the Earth: into Lakes and other Cavities: into the *Alveus* of the Ocean: and through the Fiſſures

† *Part 2. Conſ. 6.*

Fiſſures whereby *this* communicates with the Ocean *, into the Abyſs; which it filled till it came to an *Æquilibrium* with the Ocean.

4. That there muſt have paſs'd a conſiderable number of *Years* betwixt the Creation and the Deluge: and moſt probably about ſo many as *Moſes* hath aſſigned.

5. That the Deluge commenc'd in the *Spring-ſeaſon*: the Water coming forth upon the Earth in the Month which we call *May* †.

6. That not only Men, Quadrupeds, Birds, Serpents, and Inſects; the Inhabitants of the Earth and Air: but the far greateſt part of all kinds of *Fiſh* likewiſe, the Inhabitants of the Sea, of Lakes, and of Rivers, ſuffered under the Fury of the Deluge, and were killed and *deſtroyed* by it.

7. That the Deluge did not happen from an accidental Concourſe of Natural Cauſes as the Author above-cited is of Opinion ||. That very many Things were then certainly done, which never poſſibly could have been done without the Aſſiſtance of a *Supernatural Power*. That the ſaid Power acted in this Matter with *Deſign*, and with the higheſt

* *Sect.* 1. *ſupra.* *Conſ.* 2.

† *Confer. Part* 6. *ſub finem.*

|| *Theory of the Earth.* l. 1. c. 6. 8. &c.

*Wiſdom.* And that, as the Syſtem of Nature was then, and is ſtill, ſupported and eſtabliſhed, a Deluge neither could then, nor can now, happen naturally.

I cloſe up this Section with two additional Diſcourſes.

The firſt concerning the *Migration of Nations*: with the ſeveral Steps whereby the *World* was re-peopled after the Deluge by the Poſterity of *Noah*; and particularly that mighty Tract of *America.* Wherein I ſhall make out, 1. Who they were that firſt peopled it. 2. When they departed thitherwards. 3. What Courſe they took; and by what means both Men and Beaſts, as well Serpents and the other noxious and more intractible kinds of them, as the more innocent and uſeful, got thither. 4. Whether there remain any certain *Veſtigia* of a Tradition, in the Writings of the Ancients, about theſe *Americans*: and what Country they intended under the Name of *Atlantis.* 5. Whether the *Phænicians*, or any other Nation of the old World, maintained anciently any Commerce or Correſpondence with them. 6. How it happened that both the Inhabitants of *that*, and of *our* World, loſt all memory of their Commigration hence. 7. Whence came the Difference in Perſon, or in the external Shape and Lineaments of the Body: in Language: in Dyet, and manner of Living: in Clothing: in Arts and Sciences: in Cuſtoms Religious, Civil, and Military, betwixt theſe *Americans*, and their old Relations in *Aſia*, *Europe*, and *Africa*. With Animadverſions on the Writings of *Grotius*, *De Laet*, *Hornius*, and others, upon this Subject.

The Second concerning the unanimous *Tradition* of an *Univerſal Deluge* amongſt all the moſt *ancient Gentile Nations*: particularly the *Scythians*, the *Perſians*, and *Babylonians*: the *Bithynians*, *Phrygians*, *Lydians*, *Cilicians*, and other People of *Aſia Minor*: the *Hierapolitans*, *Phœnicians*, and other Inhabitants of *Syria*: the *Egyptians*, *Carthaginians*, and other *African* Nations: the moſt ancient Inhabitants of the ſeveral Parts of *Greece*: and of the other Countries of *Europe*: the old *Germans*: the *Gauls*: the *Romans*: the ancient Inhabitants of *Spain*, and even the *Britains* themſelves, the firſt Inhabiters of this Iſland: Proving that the great Devaſtation and Havock the Deluge made, both of the Earth it ſelf, of the Generality of Mankind, of Brutes, and all Animals, had wrought a deep and very ſenſible Impreſſion upon the Minds of theſe ancient Nations, who lived nearer to the time of it. That they had not only a Memory and Tradition of it in general and at large: but even of ſeveral the moſt remarkable particular Accidents of it likewiſe; which they handed downwards, to the ſucceeding Ages, for ſome time, with Notes of the greateſt Terror, Amazement, and Conſternation expreſſible. That it was commemorated chiefly by certain Religious Rites and Ceremonies uſed by them in the Worſhip of the EARTH: which Superſtitious Adoration was firſt inſtituted upon this Occaſion in thoſe ſimple and ignorant Ages †, and addreſs'd to the Earth, not only expreſly and by Name, but alſo under the feigned and borrowed Names of *Alargatis*, *Derceto*, *Aſtarte*, *Dea Syria*, *Herthus*, *Iſis*, *Magna Mater*, *Cybele*, and *Rhea*, with ſeveral more; by all which, they intended the Earth. That at length the Tradition, for want of Letters, which

† *Vid. pag.* 55. *& ſeq. ut & pag.* 95.

which were not then invented, or ſome other like means to preſerve it, wearing out, and the reaſon of the Inſtitution of this Worſhip being by degrees forgot, the After-Ages perverted it to a ſomewhat different Senſe and Intention: ſuppoſing that this was only a reverential Duty and Gratitude paid to the Earth as the Common *Parent* of Mankind; and becauſe both Man, and all other Creatures proceed out of it; by which means the true Notion of the Inſtitution being loſt, the Tradition of the Deluge, which was couched under it, was alſo thereupon at length ſuſpended and loſt; none of all theſe many Nations, in the latter Ages of the World, having any Memory or Knowledge of it, beſides what they afterwards recovered from the Jews and ancient Chriſtians, who had it from the Writings of *Moſes*. In *Greece* indeed there were ſome other Accidents which perplex'd and impeded the Tradition of it in that Country, whereof I have already † given ſuch Hints as this Diſcourſe will bear.

† *Part* 1. *pag.* 68.

# PART IV.

## *Of the Origin and Formation of Metalls and Minerals.*

WHat I can advance, with competent Certainty, about the Fluids of the Globe: the Sea, Springs, Rivers, and Rain, I propoſe in the immediately foregoing, or Third Part of this Eſſay: As in the Second Part of it I diſpatch the Solids: Stone, Marble, Gravel, and all the other Terreſtrial Matter of it, which is digeſted into *Strata.* That Part therefore comprehends the far greater ſhare of that Matter; and indeed all, excepting only *Metalls* and *Minerals*; which are found much more ſparingly and in leſſer Parcels; being either encloſed in thoſe *Strata* (lying amongſt the Sand, Earth, or other Matter whereof they conſiſt) or contained in their perpendicular Fiſſures. And *theſe* remaining ſtill to be conſidered, I have allotted this Fourth Part to that Purpoſe.

To write of Metalls and Minerals intelligibly and with tolerable perſpicuity, is a Task much more difficult than to write of either Animals or Vegetables. For theſe carry along with them ſuch plain and evident Notes and Characters either of Diſagreement, or Affinity with one another, that the ſeveral Kinds of them, and the ſubordinate Species of each, are eaſily known and diſtinguiſh'd, even at firſt ſight; the Eye alone being fully capable of judging and determining their mutual Relations, as well as their Differences.

But in the Mineral Kingdom the Matter is quite otherwiſe. Here is nothing *regular*, whatever ſome may have pretended: nothing *conſtant* or *certain*: inſomuch that a Man had need to have all his Senſes about him: to uſe repeated Tryals and Inſpections, and that with all imaginable Care and Warineſs, truly and rightly to diſcern and diſtinguiſh Things, and all little enough too. Here is ſuch a vaſt variety of *Phænomena*, and thoſe, many of them, ſo deluſive, that 'tis very hard to eſcape Impoſition and Miſtake.

*Colour*, or outward Appearance, is not at all to be truſted. A common *Marcaſite* or *Pyrites* ſhall have the Colour of Gold moſt exactly; and ſhine with all the Brightneſs of it, and yet upon tryal, after all, yield nothing of worth, but Vitriol, and a little Sulphur: whilſt another Body, that hath only the Reſemblance of an ordinary Peble, ſhall yield a conſiderable quantity of Metallick and valuable Matter. So likewiſe a Maſs, which, to the Eye, appears to be nothing but meer ſimple Earth, ſhall, to the Smell or Taſte, diſcover a plentiful Admixture of Sulphur, Alum, or ſome other Mineral.

Nor may we with much better Security rely upon *Figure*, or external Form. Nothing more uncertain and varying. 'Tis uſual to meet with the very ſame Metall or Mineral, naturally ſhot into quite different Figures: as 'tis to find quite different kinds of them all of the ſame Figure. And a Body, that has the ſhape and appearance of a Diamond, may prove, upon Examination, to be nothing but Cryſtal, or *Selenitis*: nay perhaps only common Salt, or Alum, naturally cryſtallized and ſhot into that Form.

So likewiſe if we look into their *Situation*, and place in the Earth; ſometimes we find them in the perpendicular Intervalls: ſometimes in the Bodies of the *Strata*, being interſpers'd amongſt the Matter whereof they conſiſt: and ſometimes in both; even the gemmeous Matter it ſelf, (if I may ſo ſpeak) with this only difference, that thoſe Gemms, *e. g.* Topazes, Amethyſts, or Emeralds, which grow in the Fiſſures, are ordinarily cryſtallized, or ſhot into angulated Figures: whereas in the *Strata* they are found in rude Lumps, and only like ſo many yellow, purple, and green Pebles. Not but that even theſe that are thus lodged in the *Strata* are alſo ſometimes found cryſtallized †, and in form of Cubes,

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† *The Cryſtallized Bodies found in the perpendicular Intervalls are eaſily known from thoſe which are lodged in the* Strata, *even by one who did not take them thence, or obſerve them there. The* former *have always their Root, (as the Jewellers call it) which is only the Abruptneſs at that end of the Body whereby it adhered to the Stone, or ſides of the Intervalls, which Abruptneſs is cauſed by its being broke off from it. Thoſe which are found in the* Strata *of Earth, Sand, or the like, (having lain looſe therein) are intire, and want that Mark of Adheſion: but thoſe which are incloſed in Stone, Marble, or ſuch other ſolid Matter, being difficultly ſeparable from it, becauſe of its Adheſion to all ſides of them, have commonly ſome of that Matter ſtill adhering to them, or at leaſt Marks of its Abruption from them, on all their ſides; wherein theſe differ from thoſe found in the perpendicular Intervalls, they adhering, as we have noted, by only one end.* Vid. Conſ. 6. &c. infra.

Rhombs, and the like *. Or if we have reſpect to *the terreſtrial Matter wherein they lye* in thoſe *Strata*, here we ſhall meet with the ſame Metall or Mineral embodied in Stone, or lodged in Cole, that elſewhere we found in Marle, in Clay, or in Chalk ‖.

* *Vid.* Conſ. 2. *infra.*

‖ *Vid.* Conſect. 3. *infra.*

As much Inconſtancy and *Confuſion* is there in their *Mixtures with each other*, or their Combinations amongſt themſelves; for 'tis rare to find any of them pure, ſimple, and unmixt: but Copper and Iron together in the ſame Maſs: Copper and Gold: Silver and Lead: Tin and Lead: yea ſometimes all the ſix promiſcuouſly in one Lump. 'Tis the ſame alſo in Minerals; Nitre with Vitriol: Common Salt with Alum: Sulphur with Vitriol: and ſometimes all five together. Nor do Metalls only ſort and herd with Metalls in the Earth: and Minerals with Minerals: but both indifferently and in common together: Iron with Vitriol, with Alum, with Sulphur: Copper with Sulphur, with Vitriol, *&c.* yea Iron, Copper, Lead, Nitre, Sulphur, Vitriol, and perhaps ſome more in one and the ſame Maſs. In a word, the only ſtanding Teſt, and diſcriminative Characteriſtick of any Metall or Mineral muſt be ſought for in the conſtituent Matter of it: and it muſt be firſt brought down to *that* before any certain Judgment can be given. And when that is once done, and the ſeveral kinds ſeparated and extracted each from the other, an homogeneous Maſs of one kind is eaſily diſtinguiſhable from any other: Gold from Iron: Sulphur from Alum: and ſo of the reſt. But without *this*, ſo various are their Intermixtures, and ſo different the Face and Appearance of each, becauſe of that Variety, that ſcarcely any thing can be certainly determined of the particular Contents of any ſingle Maſs of Ore by meer Inſpection. I know that by Experience and Converſation with theſe Bodies, in any Place or Mine, a Man may be enabled to give a near Conjecture at the Metallick or Mineral Ingredients of any Maſs commonly found there; but this meerly becauſe he hath before made tryal of other like Maſſes, and thereby learned what it is they contain. But if he remove to another place, though perhaps very little diſtant, 'tis ten to one but he meets with ſo different a face of Things, that he'll be there as far to ſeek in his Conjectures as one who never before ſaw a native Ore, untill he hath here made his tryals as before, and ſo further informed himſelf in the matter.

*Metalls* being ſo very uſeful and ſerviceable to Mankind, great Care and Pains hath been taken, in all Ages, in ſearching after them, and in ſeparating and refining of them. For which reaſon 'tis that *theſe* have been accurately enough *diſtinguiſh'd*, and reduced to ſix kinds, which are all well enough known. But the like pains hath not been taken in Minerals; and therefore the Knowledge of them is ſomewhat more confuſed and obſcure. Theſe have not yet been well reduced, or the number of the ſimple original ones rightly fixt; ſome, which are only Compounds, the Matter of two or more kinds being mix'd together, and, by the different Proportion and Modulation of that Matter, variouſly diſguiſed and diverſifyed, having been reputed all different kinds of Minerals, and thereby the Number of them unneceſſarily multiplied. Of this we have an Inſtance in the Gemm-kind; where, of all the many ſorts reckoned up by *Lapidaries*, there are not above three or four that are *Original*; their Diverſities, as to Luſtre, Colour, and Hardneſs, ariſing from the different Admixture of other adventitious Mineral Matter. But the farther and clearer Adjuſtment of this Affair I am conſtrained to adjourn to the larger Treatiſe.

In the mean time 'tis ſufficient for my preſent Deſign, to remark in general, that thoſe *Minerals* and Ores of *Metalls* which are repoſited in the *Bodies of the Strata*, are either found in *Grains*, or ſmall Particles, diſperſedly intermix'd with the Corpuſcles of Earth, Sand, or other Matter of thoſe *Strata*: or elſe they are *amaſs'd* into *Balls*, *Lumps*, or *Nodules*. Which *Nodules* are either of an *irregular* and uncertain Figure, ſuch as are the common *Pyritæ*: *Flints*, *Agats*, *Onyx's*: *Pebles*, *Cornelions*; *Jaſpers*, and the like: or of a Figure ſomewhat more *regular* and obſervable, ſuch as the *Belemnites*: the ſeveral ſorts of *Mineral Coral*, of the *Stelechites*, and of the *Lapis Mycetoides*‖: the *Aſtroites*, or *Starry-Stone*, as well that ſort with the *Prominent*, as that with the *Concave Stars*: the *Selenites*: the

‖ *Vulgarly call'd* Fungites.

the *Echinated Cryſtalline Balls*, with many more analogous Bodies.

Thoſe which are contained in the *Perpendicular Intervalls* of the *Strata* are, either ſuch as are there accumulated into a *rude Heap*, without any particular Form or Order, being only included betwixt the two oppoſite Walls or Sides of the ſaid Intervalls, which they wholly or partly fill, as there is a greater or leſs quantity of them; in which manner *Spar* is uſually found herein, and other Minerals, as alſo the common Ores of *Lead*, *Tin*, *Iron*, and other *Metals*: or elſe ſuch as are of ſome *obſervable Figure*; of which ſort are the *Sparry Striæ*, or *Iceycles* called *Stalactitæ* *: the *Native Saline Iceycles*, or *Sal Stalacticum*: the *Vitriolum Stalacticum Nativum*: the *Vitriolum Capillare*: the *Alumen Stalacticum*, and *Capillare*: *Minera ferri Stalactica*, which, when ſeveral of the Cylindrick *Striæ* are contiguous, and grow together into one Sheaf, is called *Bruſh-Iron-Ore*: *Argentum Arboreſcens*, & *Capillare*: as alſo the *Cryſtallized Ores and Minerals*, e. g. the *Iron-Rhombs*, the *Tin-Grains*: the *Mundick-Grains*: *Cryſtallized Native Salt*, *Alum*, *Vitriol*, and *Sulphur*:

* *Or rather* Stagonitæ.

of which ſort likewiſe are the *Gemms* or Stones that are here ſhot into Cubes, into Pyramidal Forms, or into angulated Columns, conſiſting of ſix Sides, and mucronated or terminating in a Point: being either opake, or pellucid: or partly pellucid, and partly opake, and coloured, black, white, grey, red, purple, blue, yellow, or green: *e. g. Cryſtall*, *the Pſeudo-Adamantes*, *the Corniſh-Stones*, *the Briſtow-Stones*, *Cryſtallized Sparrs*, *the Iris*, *the Amethyſt*, *the Saphire*, *the Topaz*, *the Emerauld*, and ſeveral others.

My Buſineſs here is to enquire into the Origin and Production of theſe Metallick and Mineral Bodies: to enquire how they came into this condition, and attained theſe Figures. And as my Obſervations have been the light whereby I have hitherto ſteered my Courſe, ſo I here betake my ſelf unto them again; and 'tis from them that I prove,

I. That as the more groſs and maſſive parts of the Terreſtrial Globe: the *Strata* of Stone, Marble, Earth, and the reſt, owe their preſent Frame and Order to the Deluge *; ſo likewiſe do Metalls and Minerals too; the far

* *Vid. Part* 2.

greater part of them, I mean all thoſe which we now find lodged in thoſe *Strata* amongſt the Sand, Earth, *&c.* being actually repoſed therein during the time that the Water covered the Earth: and the Earth it ſelf then put into ſuch a condition that the reſt, I mean thoſe we now find in the perpendicular Intervalls, ſhould be collected thither by degrees, and be formed almoſt of courſe, meerly by the ordinary Motion of the Water, and its Paſſage to and fro in the Earth *. *Vid. Conſ. 4. and 5. infra.*

2. That whilſt the Corpuſcles of Metalls and Minerals, together with thoſe of Stone, Marble, Cole, Chalk, and the like courſer Matter: as alſo the Shells, Teeth, and other parts of Animals and Vegetables: were ſuſtained in the Water, at the Deluge †; after ſome time, that the violence of the Hurry and Commotion was over, and the Water come to a ſtate ſomewhat more calm and ſedate, ſuch of thoſe Corpuſcles, as happened to occurr or meet together, affix'd to each other: and, many of them convening, uniting, and combining into one Maſs, formed the Metallick and Mineral Balls or Nodules which we now find. † *Part 2. Conſect. 2.*

That all Metallick and Mineral *Nodules* whatever: as well thoſe which are in *rude* Lumps, ſuch as the common *Pyritæ*, Flints, Agates, Onyxes, Pebles, Jaſpers, Cornelions, and the like: as thoſe which are of a more *regular* and obſervable Shape, ſuch as the Selenites, Belemnites, Stelechites, Mineral Coral: and, in one word, all others whatſoever, were formed at this time and by this means.

That in ſuch parts of the Water where the Corpuſcles ſo ſuſtained chanced to be all of the ſame kind *: or, at leaſt, where there were fewer kinds or varieties of them, the Nodules, which were thus formed out of them, were more *ſimple*, pure, and homogeneous, as are the Selenites, and ſome kinds of Pebles and Flints, to name no more: But where (as indeed it generally fell out) there happened to be a greater variety of Corpuſcles, as ſuppoſe of Sulphur, of Vitriol, of Alum, of Iron, of Copper, or whatever elſe, ſuſtained promiſcuouſly together, there the Nodules, formed out of them, were *mixt*, and conſiſted of a greater variety of Matter confuſedly aſſociated into the ſame Lump. Of this the *Pyritæ*

* *Vid.* Part 5. *Conſ.* 1.

may ſerve for an Example; whereof ſome yield Iron, Sulphur, and Vitriol: others Copper and Alum: yea ſome of them contain all theſe, and ſeveral more, in the ſame Nodule.

That the Bones, Teeth, Shells, and other like Bodies, being ſuſtained in the Water together with theſe Metallick and Mineral Corpuſcles ||; and the ſaid Corpuſcles meeting with, and hitting upon thoſe Bodies, they affix'd unto them, and became conjoyned with them: ſome of them (though this very rarely) paſſing into their Pores and Interſtices: others adhering in Lumps, or Maſſes, to their Out-ſides, and indeed oftentimes combining in ſuch numbers upon the exteriour Surface of the Shell, Tooth, *&c.* as wholly to cover and involve it in the Maſs they together conſtituted: and others of them entering into the Cavities of the *Echini*, *Cochleæ*, *Conchæ*, and other Shells, till they had quite filled them up; thoſe Shells, by that means, ſerving as Proplaſmes, or Moulds, to the Matter which ſo filled them, limiting and determining both the Dimenſions and Figure of it. That accordingly we at this day find ſome few of theſe

|| *Part* 2. *Conſ.* 2.

foſſil Shells, and other Animal Subſtances, with Iron-ore, Spar, Vitriol, Sulphur, and the like, intruded into their Pores; but far greater numbers of them with Lumps of Flint, Ores of Metalls, and Minerals, growing firmly to the Out-ſides of them, and oftentimes in ſuch quantity as that the Shell or Tooth is wholly covered by thoſe Minerals, being immers'd or included in the Maſs they conſtitute; inſomuch that 'tis very uſual, upon breaking Flints, *Pyritæ*, &c. to find *Pectines*, *Conchæ*, and the like, encloſed, even in the very middle of them. As common is it to find *Echini*, *Cochleæ*, *Conchæ*, and other Shells, having their Cavities fill'd up with Ores of Metalls, Flint, Spar, Native Vitriol, Sulphur, and other Minerals. Not but that theſe Minerals many times ſurvive the Shells which gave them their Forms, and are found even after *they* are rotted and diſappeared; for though, when lodged in Chalk, or the like cloſe Matter, which preſerves and ſecures them againſt external Injuries, theſe Shells are conſtantly found upon, and actually inveſting the Flint, Spar, or other Mineral, and are commonly as fair and entire as any of their fellow Shells at Sea: yet when they happened to be lodged amongſt Sand, Gravel, or the like laxer Matter, the Shells are uſually periſh'd and gone *, and ſo the Flint, Spar, &c. left uncover'd. In which caſe the ſaid Flint, Spar, or other Mineral, is of a conſtant, regular, and ſpecifick Shape, as is the Shell whence it borrows both that Shape, and indeed its Name; theſe being the Bodies which are called, by Naturaliſts, *Echinitæ*, *Cochlitæ*, and *Cochitæ* ||, as reſembling the Shells of thoſe names; and truly many of them very nearly, they having taken the *Impreſſes* of the Inſides of theſe Shells with that exquiſite Niceneſs as to expreſs even the ſmalleſt and fineſt Lineaments of them: inſomuch that no Metall, when melted and caſt in a Mould, can ever poſſibly repreſent the Concavity of that Mould with greater Exactneſs than theſe Flints, and other Minerals, do the Concavities of the Shells wherein they were thus moulded.

* Vid. Part 3. Sect. 1. Conſ. 11.

|| Conſ. Part 5. Conſ. 5.

3. That at length all this Metallick and Mineral Matter, both that which continued aſunder, and in ſingle Corpuſcles, and that which was amaſs'd and

concreted into Nodules, *ſubſided* down to the bottom: at the ſame time that did the Shells, Teeth, and other like Bodies, as alſo the Sand, Cole, Marle, and other Matter whereof the *Strata* of Sand-ſtone, Cole, Marle, and the reſt are for the moſt part compoſed †, and ſo were included in, and lodged amongſt, that matter.

That in regard that both the ordinary Terreſtrial Matter, and the Mineral and Metallick Matter which was aſſumed up into the Fluid was *different* in different parts of it, being in ſome places all chiefly of one kind, ſuppoſe Sand: in others of a different kind, *e.g.* Chalk: and in others of ſeveral kinds together, as Sand, Chalk, and many more: and there being no other Place or Apartment in the Globe aſſigned to any of this Matter than that whereinto its own natural Gravity bore it, which was only directly downwards, whereby it obtained that place in the Globe which was juſt underneath that part of the Fluid where it was ſuſtained when the Subſidence began; it thence happened that the *Strata*, which were afterwards conſtituted by this Matter thus ſubſiding,

are

† *Conf. Part* 2. *Conf.* 3.

are alſo *different* in different places: in ſome all, or moſt of them, of Sand-ſtone: in others of Chalk: and in others of both Sand-ſtone and Chalk, and perhaps many more, lying each upon other. And the Caſe of Metalls and Minerals being the ſame, 'tis for that reaſon that in ſome places we now get Iron, or Vitriol; but no Copper, or Alum: in others we find theſe, but not thoſe: and in others both theſe, and thoſe, and perhaps many more.

That the *Place*, both of the ſeveral ſorts of Terreſtrial Matter, and of Metalls and Minerals, whilſt ſuſtained in the Fluid, being thus contingent and uncertain, their *Intermixtures* with each other, and with the Terreſtrial Matter, in the Sediment, or *Strata*, which ſubſiding they together compoſed, muſt conſequently be uncertain likewiſe; that Metall or Mineral, of whatever kind it chanced to be, which was ſuſtained in any part of the Fluid, ſetling only directly downwards, was lodged amongſt the Terreſtrial Matter which chanced to be ſuſtained together with it in the ſame part, of what kind ſoever that Matter was. And accordingly we now find them uncertainly mixt: the ſame Metall or Mineral lodged, in ſome places, in Stone: in others, in Cole: and in others, in Clay, Marle, or any other Matter indifferently †. And as we find the ſame Metall or Mineral lodged amongſt different ſorts of the common Terreſtrial Matter, ſo do we, for ſtill the ſame reaſon, alſo find different kinds of Metalls and Minerals, Copper, Iron, and Sulphur, Tin, Lead, and Vitriol, with ſeveral more, lodged all confuſedly together in the very ſame ſort of Terreſtrial Matter ‖.

That the *quantity* of the Metallick or Mineral Matter taken up into the Fluid was various and uncertain: there being in ſome parts little or perhaps none of it: in others a very great abundance. And ſo we at this day find it; in ſome places, little, or none: in others, in ſuch plenty as to exceed even the ordinary Terreſtrial Matter, and of it ſelf to compoſe whole *Strata*, without any conſiderable Admixture of Sand, Clay, or other common Matter. Thus we ſometimes ſee whole *Strata* compiled of Metallick and Mineral *Pyritæ*: others of Pebles, and of Flints, without the Interpoſition of any other Matter: that finer Matter com-

† *Vid. pag.* 174. *ſupra.*

‖ *Vid. Pag.* 174. *ſupra.*

commonly found amongſt theſe, and vulgarly called *Sand*, being really no other than very ſmall Pebles; as may appear to any one who ſhall carefully examine and obſerve it, eſpecially with a good Microſcope. Thus likewiſe we find *Strata* conſiſting almoſt entirely of Common Salt: others of Ochre: and others of ſeveral Metalls and Minerals, Tin, Lead, Vitriol, Nitre, and Sulphur, promiſcuouſly, without any conſiderable Intermixture of coarſer Terreſtrial Matter.

4. That the metallick and mineral Matter, which is now found in the perpendicular Intervalls of the *Strata*, was all of it originally, and at the time of the Deluge, lodged in the Bodies of thoſe *Strata*: being interſperſed or ſcattered in ſingle Corpuſcles, amongſt the Sand, or other Matter, whereof the ſaid *Strata* mainly conſiſt. That it was educed thence, and tranſmitted into theſe Intervalls, ſince that time; the Intervalls themſelves not exiſting till the *Strata* were formed, and the metallick and mineral Matter actually lodged in them; they being only Breaches of the *Strata*, and not made till the very concluſion

of the Cataſtrophe, the Water thereupon immediately withdrawing again from off the Earth *.

That the *Water* which aſcends up out of the Abyſs, on all ſides of the Globe, towards the Surface of the Earth †, inceſſantly pervading the Pores of the *Strata*, I mean the Interſtices of the Sand or other Matter whereof they conſiſt, detaches and bears along with it all ſuch metallick, mineral, and other Corpuſcles which lye looſe in its way, and are withal ſo ſmall as to be able to paſs thoſe Interſtices: forcing them along with it into the perpendicular Intervalls; to which it naturally directs its courſe, as finding there a ready Exit and Diſcharge ||, being partly exhaled thence up into the Atmoſphere, and partly flowing forth upon the Surface of the Earth, and forming Springs and Rivers.

That the Water which falls upon the Surface of the Earth in *Rain*, bears alſo ſome, though a leſſer, ſhare in this Action; this, ſoaking into the *Strata* which lye near the Surface, ſtraining through the Pores of them, and advancing on towards their perpendicular

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* *Conſ. Part* 2. *Conſ.* 3. & 6. and *Part* 3. *Sect.* 2. *Conſ.* 3. *uti & Part* 4. *Conſ.* 3. 5.

† *Part* 3. *Sect.* 1. *Conſ.* 8.

|| *Ibid.*

lar Intervalls *, bears thither along with it all ſuch moveable Matter as occurrs in thoſe Pores, in much the ſame manner as does the Water which ariſes out of the Abyſs; with this only difference, that *this* paſſes and pervades none but the ſuperficial and uppermoſt *Strata*, whereas *the other* permeates alſo thoſe which lye lower and deeper.

* *Part* 3. *Sect.* 1. *Conſ.* 4.

That the metallick and mineral Corpuſcles, being thus conveyed into theſe Intervalls; and the Water there having more room and freer paſſage than before, whilſt it only penetrated the Pores of the Stone, it deſerts the ſaid Corpnſcles, leaving them in theſe Intervalls; unleſs it flow forth with a very rapid and precipitate Motion; for then it hurries them out along with it, till its Motion becomes more languid and remiſs, when it quits and abandons them †.

† *Conf. Conſ.* 12. & 13. infra.

6. That by the Water, thus paſſing through the Stone to its perpendicular Intervalls, was brought thither all the metallick and mineral Matter which is now lodged therein: as well that which lyes only in an indigeſted and confuſed Pile ||, in which manner the far greateſt part of it is found, and particularly the

|| *Vid. Pag.* 178. ſupra.

the common Ores of Metalls, Iron, Tin, Lead, and the reſt, as alſo Spar, Alum, Vitriol, Sulphur, and other Minerals: as that which is diſpoſed and formed into ſome obſervable Figure, ſuch as the metallick and mineral *Stalactitæ*, the angulated or Cryſtallized Metalls and Minerals *, and, to be ſhort, all others whatever.

7. That there is not, whatever ſome Men may have fancied, any thing very ſtrange or extraordinary in the Production of the ſaid formed Metalls and Minerals, which are found in theſe Intervalls: nor other plaſtick Vertue concerned in ſhaping them into thoſe Figures than meerly the Configurations of the Particles whereof they conſiſt, and the ſimple Motion of the Water to bring thoſe Particles together. That particularly the common *Stalactites*, *Lapis Stillatitius*, or Drop-ſtone, which conſiſts principally of Spar, and is frequently found, in form of an Icycle, hanging down from the tops and ſides of Grotto's, and of the leſſer perpendicular Intervalls, was formed by the Water which continually is paſſing through the *Strata* into theſe their Intervalls; *this* taking the

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* *Vid. Pag.* 178. ſupra.

Sparry Particles as they lay diſperſedly mingled with the Sand, or other Matter whereof thoſe *Strata* conſiſt, and bearing them on with it to the ſaid Intervalls; where iſſuing leiſurely out of the *Strata*, and having now free paſſage, it deſerts theſe Particles, falling down from the tops and ſides of the Grotto's, to which the Particles affixing by little and little, incruſt them over with a Sparry Cover, and alſo from theſe *Stalactitæ*, from which the Water is continually falling and diſtilling drop by drop; which gave occaſion to that Miſtake of thoſe who ſuppoſe theſe Bodies to be only Water petrified, as they ſpeak, or converted into theſe Sparry or Stony Iceycles, in the ſame manner as it is by Froſt congealed into the Icy ones which hang down from the Eaves of Houſes, from Pipes, or other conveyances of Water. That the *Iron*, and *other metallick Stalactitæ*: the *Aluminous*, and the *Vitriolick Stalactitæ*: the *Saline* ones, or thoſe which conſiſt of common Salt, and *all others*, are found ſuſpended in the ſame manner, and their Matter conducted out of the *Strata* to their Fiſſures by the ſame means.

8. That the Iron-Rhombs, Tin-Grains, and other Ores of Metalls, which are found in theſe Intervalls naturally formed into Cubick, Pyramidal, or other Figures: as likewiſe the Minerals which are there ſhot into the like Figures, ſuch as the Mundick-Grains, cryſtallized native Salt, Alum, Vitriol, and Sulphur: the Gemms alſo which are thus figured, *e. g.* Cryſtal, the Pſeud-Adamantes, the Amethyſt, Emerauld, and the reſt: I ſay theſe, and all other natural metallick and mineral Cryſtallizations, were effected by the Water, which firſt brought the Particles whereof each conſiſts out from amongſt the Matter of the *Strata*, into theſe their Intervalls, in much the ſame manner that the common, or artificial, Cryſtallizations of Alum, Vitriol, and the like, are now effected in the Water wherein they were before diſſolved: and as are the Chymical Cryſtallizations of other Minerals and Metalls in their ſeveral *Menſtrua*; whereof more in its place.

9. That the Corpuſcles of Metalls and of Minerals being *ſmaller* than thoſe of Sand and of the other common Terreſtrial Matter, and conſequently the

Pores of the *Strata* which conſiſt mainly, or at leaſt contain in them a conſiderable quantity of theſe *, being leſſer and narrower than thoſe of the *Strata* of Sand-ſtone, and the like common and craſſer Matter, the Water which aſcends from beneath towards the Surface of the Earth is admitted into them, if at all, only in leſſer quantity, paſſes them ſlowly and difficultly, and therefore hath not Scope and Power ſufficient to diſlodge the Corpuſcles, and bear them off with it into the perpendicular Intervalls, as it does in thoſe *Strata* which conſiſt chiefly of Stone, and the like groſſer Matter, where the metallick and mineral Corpuſcles lye thinner, and ſo the Pores are more wide and open. That, for this reaſon, in the Intervalls of thoſe *Strata* which abound plentifully with Iron, Tin, Spar, common Salt, Alum, or the like, we ordinarily find a leſſer quantity of theſe Metalls and Minerals reſident, than we do in the Intervalls of ſome other *Strata* which now ſhew little, or perhaps nothing in the Bodies of them beſides Sand and ſuch like coarſer Matter; there being ſo admirable a Contrivance in this Affair, that

the

* *Confer. Conſect.* 3. *Pag.* 188. ſupra.

the Water does not diſturb and remove that metallick or mineral Matter which lyes in the *Strata* in great plenty, and is there ready collected to the hand of Man: but only *that* which needs ſuch an Agent to collect it: *that* which is ſo ſparingly and diſperſedly intermix'd with the common Terreſtrial Matter, as not to be diſcoverable by humane Induſtry, or, if diſcoverable, ſo diffuſed and ſcattered amongſt the craſſer and more unprofitable Matter, that 'twould never be poſſible to ſeparate and extract it: or, if 'twas, it would not defray the Charge and Labour of the Extraction, and therefore muſt needs have been all irretrievably loſt, and uſeleſs to Mankind, was it not here by this means collected and brought into one Maſs.

That therefore the Metalls and Minerals which are lodged in the *perpendicular Intervalls* of the *Strata*, do ſtill *grow*, (to ſpeak in the Mineraliſts phraſe) or receive additional Encreaſe from the Corpuſcles which are yet daily born along with the Water into *them*: and have grown ſo ever ſince the time of the Deluge, in all ſuch places where thoſe Intervalls are not al- 10.

ready ſo filled, that they cannot receive any more; or where the Stock of metallick and mineral Corpuſcles, originally lodged in the *Strata*, is not quite exhauſted, and all borne thither already. That yet this Encreaſe is ~~not~~ now any where very great; the Corpuſcles, which were capable of being ſtirred and removed, being, by the continual Paſſage of the Water for ſo many Ages, in moſt places exhauſted, educed forth of the *Strata*, and tranſmitted into theſe their Fiſſures.

11. That the metallick and mineral Matter which lyes in the *Bodies* of the *Strata* does *not* now *grow*: nor hath it ever received any Addition ſince 'twas firſt repoſed in thoſe *Strata* at the time of the Univerſal Deluge: but, on the contrary, hath been diminiſhed and leſſened by ſo much as hath been conveyed into their perpendicular Intervalls, and as hath been brought forth upon the Surface of the Earth by Springs, Rivers *, and Exhalations † from the Abyſs, ever ſince that time. That notwithſtanding there have, and do ſtill, happen, Tranſitions and Removes of it, in the *ſolid* Strata, from one part of the ſame *Stratum* to another

* *Vid.* Conſ. 12. *infra.*

† *Vid.* Conſ. 14. *infra.*

ther part of it, occaſioned by the Motion of the Vapour towards the perpendicular Intervalls of *theſe**: and, in the *laxer* Strata, ſuch as thoſe of Sand, Clay, and the like, from the lower ones to thoſe which lye above them, and even to the very Surface of the Earth, occaſioned by the Motion of the Vapour directly towards the Surface, it pervading theſe looſer *Strata* diametrically †. But of this I have not room to enlarge more particularly in this place.

12. That the Bitumen which is found in Lumps, or coagulated Maſſes, in ſome *Springs*; and which is, in others, found floating in form of an Oyl upon the Surface of the Water; when 'tis called by Naturaliſts *Naphtha*, and *Petroleum*: the Salt wherewith the *Salinæ*, or Salt-Springs, abound: the Vitriol, Alum, Nitre, Sulphur, Spar, and other Minerals, wherewith the *Acidulæ*, or Medicinal-Springs are ſaturated: I ſay, all theſe Minerals were originally lodged in the *Strata* of Stone, Cole, Earth, or the like: that they were educed thence, and conveyed into theſe Springs, by the Water pervading thoſe *Strata* in its paſſage from the Abyſs towards the ſaid Springs ||.

* *Part* 3. *Conſ.* 8.

† *Ibid.*

|| *Conſ. Part* 3. *Sect.* 1. *Conſ.* 8. and *Part* 4. *Conſ.* 5.

13. That when the Water of *Rivers* iſſues out of the Apertures of them with more than ordinary Agitation and Rapidity, it uſually bears forth along with it ſuch Particles of Spar, Argilla, or other looſe and moveable Matter as it met with in its Paſſage through the Stone, Marble, or other ſolid *Strata*: that it ſuſtains theſe Particles, and carries them on together with it till ſuch time as its Motion begins to remit and be leſs rapid than it was at, and near its Source; when by degrees it lowers them, and lets them fall, depoſing and affixing them upon any thing which occurrs in the way, as Stones, Shells, Sticks, or other like Bodies; eſpecially thoſe which lye in the Sinus's or Creeks of thoſe Rivers where the Motion of the Water is more ſluggiſh and languid than in the Stream, or middle of the Chanel. That ſome Rivers do thus bring forth Spar, and other mineral Matter in great quantity, ſo as to cover and incruſt the Stones, Sticks, and other Bodies lying therein, to a very conſiderable Thickneſs. That ſometimes the Water of Standing-Springs does the ſame: precipitating the mineral Matter which it brought

forth of the *Strata*, upon the Stones at the bottoms and ſides of the ſaid Springs: and affixing it upon Sticks, Straws, and other Bodies, and upon the Moſs, or other Plants which happen to grow therein, incruſting them over, in like manner as does the abovementioned Water of Rivers.

14. That when the Heat at, and upon, the Surface of the Earth is great, it not only mounts up the Water ſent from beneath, and, along with it, the lighter Terreſtrial Vegetative Matter *, but likewiſe the very mineral Matter it ſelf, Sulphur, Nitre, Vitriol, and the like; the Atoms, or ſingle Corpuſcles whereof being detach'd from their reſpective Beds in the Earth, it bears quite to the Surface of it, and the light and more active ſorts of them up into the Atmoſphere, (together with the Vapour, which, when condenſed, falls down again in Rain) in greater or leſſer plenty, and to a greater or leſſer height, anſwerably to the greater or leſſer quantity or Intenſeneſs of the Heat.

That wherever there happen to be any extraordinary Diſcharges of the Subterranean Heat: either *Vulcano's*, or leſſer Spiracles, ſuch as thoſe about

* *Part* 1. *Pag.* 47. and *Part* 3. *Sect.* 1. *Conſ.* 8.

*Naples*, *Pozzuolo*, and in other Parts of the World: *Thermæ*, or *Hot-ſprings*: or fiery Eructations, ſuch as burſt forth of the Earth during Earthquakes: I ſay wherever there are ſuch or the like Diſcharges of this Subterranean Fire, there likewiſe is mineral Matter, more or leſs, hurried up along with it. That even the Heat of the Sun, and indeed any other, though but an accidental Heat, hath the ſame Effect, and contributes to the raiſing of mineral Matter out of the Earth.

That *Ætna*, *Veſuvius*, and the other *Vulcano's* diſcharge forth, together with the Fire, not only metallick and mineral Matter in great quantity, but Sand likewiſe, and huge Stones, toſſing them up ſometimes to a very great height in the Air.

That the Heat, which ariſes out of the *leſſer Spiracles*, alſo brings forth along with it mineral Matter, and particularly Nitre, and Sulphur; ſome of which it affixes to the tops and ſides of the Grotto's as it paſſes, which Grotto's are uſually ſo hot as to ſerve for natural Stoves, or Sweating-Vaults: ſome it depoſes near unto, and even upon, the Surface of the Earth; inſomuch that in ſome places the *Flores Sulphuris* are gathered in conſiderable plenty near theſe Spiracles: ſome it bears in Steams up into the Air, and this in ſuch quantity too as to be manifeſt to the Smell, eſpecially the Sulphur, *no* Mineral ſo particularly affecting *this* Senſe.

That the Heat which is continually paſſing up towards the *Thermæ*, brings thither along with it Particles of Spar, Alum, Sulphur, Nitre, and other Minerals in ſuch quantity, that theſe ordinarily as much exceed the common *Acidulæ* * in plenty of this mineral Matter as they do in Heat. That this Heat, aſcending out of the *Thermæ*, bears up with it not only Water, in form of Vapour, but likewiſe mineral Matter; ſome whereof it affixes to the Sides and Arches of the *Grotto's*, where theſe *Thermæ* ariſe in *ſuch*: or, if they be covered with *Buildings*, to the Walls and Roofs of thoſe Buildings: to the Pipes through which the Water is conveyed, or the like. That Sulphur is in ſome places collected very plentifully adhering to the Stone of theſe Grotts, and Buildings: yea ſometimes Spar, and other craſſer Minerals, are thus mounted

* *Vid. Conſ.* 12. *ſupra.*

mounted up, and affix to the Walls and Roofs, incruſt them over, and, being ſtop'd and reverberated thereby, form *Stalactitæ*, or Sparry Iceycles hanging down from the Arches of the Grotto's, from the Capitals of the Pillars, and Roofs of the Buildings. That where theſe *Thermæ* are not thus covered and vaulted over, ſo that the mineral Matter is not ſtop'd and hinder'd in its Aſcent, a great part of it advances directly up into the Atmoſphere.

That the Heat which is diſcharged out of the Earth at the time of *Earthquakes* || brings forth Nitre, Sulphur, and other mineral Matter along with it. That the Water alſo which is at the ſame time ſpued out *, through the Cracks or Chaſmes opened by the Earthquake, and through the Apertures of Springs and Rivers, is turbid and ſtinking, as being highly ſaturated with mineral Matter. That the *Acidulæ*, or Medical Springs emit *then* likewiſe a greater quantity of their Minerals than uſual: and even the ordinary Springs, which were before clear, freſh, and limpid, become thick and turbid, and are impregnated with Sulphur

|| *Part* 3. *Sect.* 1. *Conſ.* 12. *pag.* 139. & 141. *ſupra.*

* *Ib. pag.* 135.

phur and other Minerals as long as the Earthquake laſts. That theſe Minerals do not iſſue out only at theſe larger *Exits*, but ſteam forth likewiſe through the Pores of the Earth, occaſioning thoſe ſulphureous and other offenſive Stenches which uſually attend Earthquakes, and are the Cauſe of the *Fevers* and other *malignant Diſtempers* which commonly ſucceed them: bringing on oftentimes great Mortalities, not only amongſt Men, but even the very Beaſts and Fiſhes. That theſe mineral Eructations ariſe in ſuch quantity up into the Atmoſphere as to thicken, diſcolour, and darken it ſometimes to a very great degree.

That *any Heat* whatſoever, even an accidental one, ſuch as is that which proceeds from the Bodies of *Animals*, and from their Excrements, promotes the Aſcent of mineral Matter, but more eſpecially of that which is ſubtile, light, and active, and is conſequently moveable more eaſily, and with a leſſer Power. That by this means *Nitre* (wherever there happens to be any in the Earth underneath) is raiſed in Stables, Pigeon-Houſes, and other like Receptacles of Animals: and in thoſe places where their Dung lyes heap'd up. That 'twas this which occaſioned, in ſome, an Opinion that Nitre proceeds forth of thoſe Animals, and their Excrements; whereas it is found raiſed up, and convened or collected indifferently and as well in Buildings where Animals rarely or never come, as in thoſe they ordinarily frequent; not to mention *that* which is found ſometimes in conſiderable plenty at great depths in the Earth: in the Water of Springs, of Rivers, of Lakes, and, in ſome Parts, even of the Sea it ſelf; whereof more largely hereafter. That, in ſuch places where the Earth contains Nitre within it, though there be no ſuch adventitious Heat, if that Heat which is almoſt continually ſteaming out of the Earth be but preſerved, its Diſſipation prevented, and the Cold kept off by ſome Building or other like Coverture, *this* alone is ordinarily ſufficient to raiſe up the Nitre, and bear it out at the Surface of the Earth, (unleſs its Egreſs be impeded by Pavements, or the like Obſtructions) and mount it up into the Air, as far as thoſe Buildings will permit. For, the Cielings and Walls ſtopping it in its

Aſcent, it uſually affixes, unto them, and ſettles there. And accordingly 'tis frequently found thus affix'd to the Walls and Cielings of Ground-Rooms, Cellars, and Vaults; and this ſometimes in ſuch quantities as to form nitroſe *Stalactitæ* †, hanging down from them in form of Iceycles, eſpecially from the Tops and Arches of Cellars and Vaults.

† *Confer. Pag.* 202. *ſupra.*

That the Heat of the *Sun* in the hotter Seaſons being very intenſe, and penetrating the exteriour or ſuperficial parts of the Earth, it thereby excites and ſtirs up thoſe mineral Exhalations, in ſubterraneous Caverns, in Mines, and in Cole-pits, which are commonly called *Damps*. That it is for this reaſon that *theſe* ſeldom or never happen but in the Summer time; when, the hotter the Weather is, the greater and more frequent are the Damps. That beſides *this* of the Sun, they are alſo ſometimes raiſed by the Acceſſion of *other Heat*, and particularly by the Fires which the *Miners* uſe in the Grooves, for breaking the Rocks, and for other Ends. That the Quantity of mineral Matter thus raiſed is according as there is more or leſs of it in thoſe Mines, eſpecially of Sulphur, Nitre, and the like ſubtile and eaſily moveable Minerals: and as the Heat is *there* more or leſs intenſe. That this mineral Matter, being ſuſtained in the Air there, and floating about in the Mines, and Pits, it hits upon, and affixes it ſelf unto, the Workmens Tools, to their Cloaths, Candles, or any other Bodies that occurr. That where there is any conſiderable quantity of Sulphur in the Exhalation thus floating too and again, it takes fire at the Candles, burns with a blue Flame, and emits a ſtrong ſulphureous Smell. That theſe Damps differ in their Effects according to the different Minerals that are the Cauſe of them; ours in *England* being generally reducible to two kinds; whereof one is called the *Suffocating*, the other the *Fulminating Damp*. That the former of theſe extinguiſheth the Candles, makes the Workmen faint, and vertiginous, and, when very great, ſuffocates, and kills them. The Fulminating Damp will take fire at a Candle, or other Flame, and, upon its Accenſion, gives a Crack or Report like the Diſcharge of a Gun, and makes likewiſe an Exploſion ſo forcible as ſometimes to kill the Miners, break their Limbs, ſhake the Earth, and force Coles, Stones, and other Bodies, even though they be of very great Weight and Bulk, from the bottom of the Pit or Mine, up through the Shaft, diſcharging them out at the Top or Mouth of it, ſometimes ſtriking off the *Turn* which ſtands thereon, and mounting all up to a great height in the Air; this being ſucceeded by a Smoak, which both in Smell, and all other reſpects, reſembles that of fired Gunpowder; and is, as may appear from theſe and other *Phænomena* of it, nothing but an Exhalation of Nitre and Sulphur, which are the principal Ingredients of that Compoſition we call Gunpowder. That as theſe Damps are cauſed by Heat, ſo they are remedied by withdrawing that Heat, and by conveying forth the mineral Steams; which the Miners effect by Perflations with large Bellows: by letting down Tubes, and ſinking new Shafts; whereby they give free paſſage and motion to the Air, which ventilates and cools the Mines, purges and frees them from theſe mineral Exhalations.

That at ſuch time as the Sun's power is ſo great as thus to penetrate the exteriour Parts of the Earth: to diſturb theſe mineral Particles: and raiſe them from out the *Strata* wherein they lay, it does not only ſuſtain them in the Air of Grotto's, Mines, and other Caverns under ground, but likewiſe bears them out through the Mouths of thoſe Caverns, and through the ordinary Cracks and Pores of the Earth, mounting them up, along with the watery Exhalations, into the Atmoſphere †, eſpecially Sulphur, Nitre, and the other more light and active Minerals; where they form *Meteors*; and are particularly the Cauſe of *Thunder*, and of *Lightning*. That, this mineral Matter requiring a conſiderable degree of Heat to raiſe it, the moſt Northern Climes, and the Winter Seaſons are, for that reaſon, little or not at all troubled with Thunder; it ſeldom happening, in any great meaſure, but in the hotter Months, and in the Southern Countries, as in *Congo, Guinea,* and other Parts of *Africa*, and in the Southern Parts of *Aſia* and *America*; where 'tis, during the Seaſon of their great Rains ||, horribly loud and aſtoniſhing, and as much exceeds the

† *Vid.Part* 3. *Sect.* 1. *Conſ.* 8.

|| *Vid Pag.* 126. *ſupra.*

the Thunder of theſe Northern Climes, as the Heat there exceeds that of theſe Climes. That the mineral Matter which is diſcharged forth of *Vulcano's*, and other like Spiracles: and out of the *Thermæ*, aſcends up into the Air, and contributes to the Formation of theſe Meteors. That likewiſe the Nitre and Sulphur, which are belch'd forth of the Earth at the time of Earthquakes (the Countries which are moſt obnoxious to this Malady abounding, as I have already intimated †, with theſe two Minerals particularly;) in ſuch plenty as to thicken and darken the Air, conſtitute there a kind of Aerial Gunpowder, and are the Cauſe of that diſmal and terrible Thunder and Lightning which commonly, if not always, attend Earthquakes; even when all was till then calm and clear, and not the leaſt Sign or Preſage of any ſuch thing before the Earthquake began.

† *Vid. pag.* 141. *ſupra.*

That as the mineral Eruptions which happen during Earthquakes *: and the Steams and Damps of Mines || are detrimental to *Health*, hurtful and injurious to the Bodies of *Men* and other *Animals*, ſo likewiſe are the *Mineral Exhalations* which are thus raiſed by the

* *Vid. pag.* 203. *ſupra.*

|| *Vid. pag.* 206. *ſupra.*

*Sun* out of the Body of the Earth up into the Atmoſphere: but more eſpecially in thoſe Parts of it where there are Arſenical, or other like noxious Minerals lodged underneath. That *theſe* mingling with, and being diſſeminated in, the Air, and paſſing together with it into the Lungs in Reſpiration, are by them tranſmitted into the Body, where they infect the Maſs of Blood, create Perturbations and diſorderly Motions therein, and lay the Foundation of *Peſtilential Fevers*, and other malignant *Diſtempers*. That 'tis for this reaſon that the Southern Countries are more frequently moleſted and incommoded by theſe Diſtempers than the Northern are: and that they are more rife and ſtirring in the hotter Months, in *July* and *Auguſt*, than in the colder, *December*, *January*, and the reſt. That 'tis indeed true, that in *September* and *October*, which are none of the hotteſt Months, theſe Diſeaſes are oftentimes as epidemical as in the precedent and warmer Seaſon: and do not abate and remit in proportion to the remiſſion of the Sun's Heat in thoſe Months; but this is purely accidental, and happens meerly becauſe the Heat within the Surface of the Earth is not liable to ſo ſudden Viciſſitudes, or ſo quickly ſpent and diſperſed, as is that which is upon it, and in the Air. *This* therefore, the Pores of the Earth remaining ſtill as free, and open, as ever, continues to ſend out the mineral *Steams* as before, but in leſſer and leſſer quantity, anſwerably to the gradual Diminution of this Heat. Which Steams, though now ſent up to the Surface of the Earth only in leſſer plenty, may be much more offenſive and miſchievous than in the hotter Months when it came forth in far greater. For the Sun's power being in thoſe Months alſo greater, it then ſtraitways hurries theſe Steams up into the Atmoſphere: whereas in the colder, its power being leſſened, it cannot bear it up ſo faſt; ſo that it ſtays and ſtagnates near the Surface of the Earth, ſwimming and floating about in that Region of the Air wherein we breath; where it muſt needs be much more pernicious than when born up to a greater height, and ſo farther out of the way. And this is indeed much the *Caſe of Foggs:* particularly of thoſe which we frequently obſerve after Sun-ſetting, even in our hotteſt Months. Theſe being nothing but a Vapour, conſiſting of Water, and of ſuch mineral Matter as this met with in its paſſage, and could well bring up along with it. Which Vapour was ſent up in greater quantity all the foregoing Day, than now in the Evening; but the Sun, *then* being above the Horizon, taking it at the Surface of the Earth, and rapidly mounting it up into the Atmoſphere, it was not diſcernible, as *now* it is; becauſe, the Sun being now gone off, the Vapour ſtagnates at and near the Earth, and ſaturates the Air till 'tis ſo thick as to be eaſily viſible therein. And when at length the Heat there is ſomewhat further ſpent, which is uſually about the middle of the Night, it falls down again in a *Dew*, alighting upon Herbs and other Vegetables, which it cheriſhes, cools, and refreſhes, after the ſcorching Heat of the foregoing Day. But if it happens, as ſometimes it does, that this Vapour bears up along with it any noxious mineral Steams, it then *blaſts Vegetables*, eſpecially thoſe which are more young and tender: blights Corn and Fruits: and is ſometimes injurious even to *Men* who chance to be then abroad in the Fields. 'Tis alſo the *Caſe* of *Water* at the Surface of the Earth *; where the Springs and Rivers are very low; yea ſome of them ceaſe to yield any Water at all, in the Summer Months, becauſe the Sun's Power is then ſo great as eaſily and ſpeedily to bear up into the Atmoſphere, in ſmall and inviſible parcels, and in form of an extremely fine and thin Vapour, a very great part of the Water which is ſent up out of the Abyſs: whereas in the Winter-time the Sun is withdrawn farther off, and its power leſſened, ſo that it cannot then buoy it up as before; for which reaſon 'tis that ſo much more of it *then* ſtands at the Surface of the Earth, and ſtagnates there. So likewiſe for Rain; we learn from Experiment that there commonly falls in *England*, in *France*, and ſome other Countries, more Rain in *June* and *July*, than in *December* and *January*; but it makes a much greater *Shew* upon the Earth in *theſe* Months than in *thoſe*, becauſe it lyes longer upon it; the Sun now wanting power to exhale and bear it up ſo quickly and plentifully as then it did. 'Tis alſo the *Caſe* of the *Halitus* emitted forth of the *Lungs* of

* *Conſ.* *Part* 3. *Sect.* 1. *Conſ.* 8.

Men and other Animals. In a *Phyſiological Treatiſe*, which I have by me, concerning the *Structure and Uſe of the Parts of Animals*, diſcourſing of the Lungs, I ſhew that they are the grand Emunctory of the Body: that the main End of *Reſpiration* is continually to diſcharge and expell an excrementitious Fluid out of the Maſs of Blood: and prove from ſeveral Experiments that there paſſes out of the Body a greater quantity of Fluid Matter this way, I mean upwards, and through the Lungs, than there does of Urine, by the Kidneys, downwards. Now the Fluid, which is thus ſecreted, and expired forth along with the Air, goes off with it in inſenſible parcels, in the Summer Seaſon, when the ambient Air contains Heat enough to bear it quickly away, and ſo diſperſe it. But in the Winter, when the Heat without is leſs, it oftentimes becomes ſo far condenſed as to be viſible, flowing out of the Mouth in form of a Fume, or craſſer Vapour; and may, by proper Veſſels, ſet in a ſtrong freezing Mixture, the better to condenſe this Vapour, be collected in conſiderable quantity. But to return. That 'tis not without a very extraordinary Providence that there ſo conſtantly happens, in the Month of *September* (the time when chiefly theſe mineral Steams ſtagnate thus at and near the Surface of the Earth) a very nipping and ſevere Seaſon of *Cold*, far beyond what might, from the Sun's height and power, be then expected: beyond that of *October* and *November*: and ſometimes equal to that of *January* and the coldeſt Months: as alſo that there then ſo conſtantly happens very bluſtering and turbulent *Winds*; the Cold ſerving to check and put a ſtop to the Aſcent of this mineral Matter: and the Wind to diſſipate and convey away that which was before raiſed out of the Earth; which, was it not thus carried off, would be infinitely more fatal and pernicious to Man and other Animals than now it is. But I muſt be contented here to give only ſhort Hints of theſe, as of other, Things; and to write but obſcurely and reſervedly, untill I have opportunity to expreſs my Sentiments of them with greater Copiouſneſs, Freedom, and Perſpicuity.

Thus much of the Scheme of my Deſign in this Part have I run over:

and lead my Reader a long and tedious Jaunt in tracing out theſe metallick and mineral Bodies: in purſuing them through their ſeveral Mazes and Retreats: through the Earth, the Water, and the Air. And yet, long as it is, we are not got much further than the Borders of the Mineral Kingdom, and have done little more yet than ſettled and adjuſted Preliminaries; ſo very ample is this Kingdom, ſo various and manifold its Productions. For the foregoing Concluſions relate only to the *Origin* and *Growth* of theſe Bodies; the *Natural Hiſtory* of each *particular* Metall and Mineral, with the *Obſervations* whereon that Hiſtory is grounded, being ſtill to come. But I muſt be forced wholly to wave and ſuperſede the Detail of theſe; for I perceive, do what I can, this Abſtract will ſwell much beyond the bounds which I at firſt deſigned.

This Fourth Part will be followed by ſeveral *Treatiſes*, ſerving to confirm, and to illuſtrate ſome Paſſages in it; whereof I ſhall at preſent only mention the *four* following.

1. Rules and Directions for the *Diſcovery* of *Metalls* and *Minerals* latent in

the Earth: with an Enquiry why theſe lye ſometimes ſo near the Surface, and did not, (becauſe of their greater Gravity) at the General Subſidence in the Deluge †, fall to a much greater depth than we now find them: even to ſuch a depth as to have lain quite out of humane reach, and ſo have been all buried, and irrecoverably loſt.

† Part 2, Conſ. 3. & Part 4. Conſ. 3.

2. An Examination of the Common Doctrine about the *Generation* of *Metalls* and *Minerals*: and particularly that of the *Chymiſts*; with an Appendix, relating to the *Tranſmutation* of Metalls: detecting the Impoſtures and Eluſions of thoſe who have pretended to it: and evincing the Impoſſibility of it from the moſt plain, ſimple, and Phyſical Reaſons: proving likewiſe that there are no ſuch natural *Gradations*, and *Converſions* of one Metall and Mineral into another, in the Earth, as many have fancied. As alſo an Account of the *Mineral Juyces* in the Earth, which ſome Writers have imagined to be I know not what *Seeds* of Minerals, ſhewing that they are, for the far greateſt part, nothing but Water ſtrongly impregnated with Mineral Matter, which it derives from

the *Strata* as it paſſes through them ‖. ‖ Conſ. 5. &c. ſupra.

3. Relations, obtained from ſeveral Hands, concerning the State of Metalls and Minerals in *Foreign Countries*: in divers Parts of *Aſia*, *Africa*, and *America*, as well as in *Hungary*, *Germany*, *Sweden*, and other Parts of *Europe*: and particularly of thoſe which are not found in *England*; ſhewing that the *Condition* of theſe Bodies in thoſe remoter Regions is exactly conformable to that of ours here: and that they were all put into this Condition by the very ſame means †. † Conf. Conſ. 1. ſupra.

4. *Obſervations* concerning Engliſh *Amber*: and *Relations* from abroad, about the Amber of *Pruſſia* and other diſtant Places: with a *Diſcourſe* founded upon them, proving that Amber is not a *gummous* or reſinous Subſtance drawn out of Trees by the Sun's Heat; and coagulated and hardened by falling down into Rivers, or the Sea, as the Ancients generally believed: but is a *Natural Foſſil*, as Pebles, Flints, *Pyritæ*, and the like, are: formed at the ſame time, and by the ſame means that they were: and all of it originally repoſed in the *Strata* of Earth, Sand, *&c.* together with them. That

it is indeed found in ſome places lying upon the Shores of the Sea, and of Rivers: but 'tis alſo found at Land, and dug up (ſometimes at very great depths) in the Earth; and this as well in Places very remote from any Sea, or River, as in thoſe which are nearer unto them. That 'tis digged out of even the higheſt Mountains, and indeed all other Parts of the Earth contingently and indifferently, as the *Pyritæ*, Agates, Jaſpers, Pebles, and the reſt, are. That wherever 'tis found upon the Sea-Shores, there alſo is it as certainly found at Land, up in the neighbouring Country: and particularly in *Pruſſia*, upon whoſe Shores ſo great a quantity of Amber is yearly collected,'tis dug up almoſt all over the Country. That even that which now lyes looſe upon the Sea-Shores, was all of it originally lodged in the Earth; in the *Strata* of Sand, Marle, Clay, and the like, whereof the neighbouring Land, and the Cliffs adjacent to thoſe Shores, do conſiſt; and wherever 'tis ſo found ſcattered upon the Shores, there is it as conſtantly found lodged in the Cliffs thereabouts. That when the Sea, at High-water, comes up unto, and bears hard upon, the ſaid Cliffs, and is agitated by Winds and Storms, it frequently beats down huge pieces of Earth from them; which Earth, falling into the Water, is, by its continued Agitation and Motion diſſolved, and borne by degrees down into the Sea, being looſe, and light, and ſo eaſily reduced into leſſer Parcels, diſſolved, and waſh'd away: but the Pebles, *Pyritæ*, Amber, or other like Nodules, which happened to be repoſed in thoſe Cliffs, amongſt the Earth ſo beaten down, being hard, and not ſo diſſoluble, and likewiſe more bulky and ponderous, are left behind upon the Shores, being impeded, and ſecured, by that their bulk and weight, from being born along with the Teſreſtrial Matter into the Sea. That therefore the Sea is no ways concerned in the Formation of theſe Bodies: no more in the Formation of Amber, than of the *Pyritæ*, Flints, and other mineral Maſſes that are found together with it: but only diſlodges and diſcovers them, bears away the Earth wherein they were buried, waſhes off the Soil and *Sordes* wherein they were involved and concealed, and thereby renders them more conſpicuous, apparent, and eaſie to be found. That this is ſo known and experienced amongſt the People who are employed to gather the Amber, that they always run down to the Sea-ſide after a Storm, for that purpoſe; and, if it hath been ſo great as to beat down part of the Cliffs there, they aſſuredly find Amber, more or leſs, upon the Seas Ebb and Retirement, and after every Retreat of the Sea for ſome Tides after; the Sea not bearing down the Earth immediately and all at once, but waſhing it off by little and little, and ſo diſcovering the Amber by degrees, ſome after one Tide, and ſome after another. That particularly the Amber, Vitriolick *Pyritæ*, and other like Bodies, that are found upon the Shores of *Kent*, *Eſſex*, *Hampſhire*, and elſewhere, all came firſt from the bordering Cliffs, and were diſlodged by this means; and are found in the Earth, as well as upon the Shores, whenever 'tis laid open, as in ſinking Wells, Pits, and the like. That not only the Sea, but Rivers and Rains alſo, are inſtrumental to the Detection of Amber; and other Foſſils, by waſhing away the Earth and Dirt that before covered and concealed them. Thus the Golden *Pyritæ*, or, as they are commonly called, Gold-grains, Amethyſtine Pebles, Amber, and other Stones of Worth, are uncovered by ſuch Rivers as chance to run through the Grounds which contain thoſe Bodies in them. Thus likewiſe Rains, by their waſhing the Earth down from off the Hills *, clear, and diſcloſe ſuch *Pyritæ*, *Selenitæ*, or other Bodies that happen to be lodged, near the Surface of the Earth, in thoſe Hills: and 'tis by this means chiefly that the Grain-Gold, upon all the *Golden Coaſt* (as 'tis called) in *Guinea*, is diſplayed; the Rains falling there in great Abundance, and with incredible Force, thereby the more powerfully beating off the Earth. This the *Negroes*, Natives of thoſe Parts, know full well; and therefore do not expect to find much of it unleſs after the Seaſon of their Rains ||; when they never fail to find of it, no more than the Amber-Gatherers fail of finding *that* upon the Sea-Coaſts after a Storm. And if thoſe Perſons who are curious in *collecting* either *Minerals*, or the *Shells*, *Teeth*, or other Parts of Animal Bodies that have been buried in the

* *Part* 5. *Conſ.* 2.

|| *Vid. Part* 3. *Sect.* 1. *Conſ.* 8. *Pag.* 126.

the Earth, do but ſearch the *Hills* after *Rains*, and the *Sea-Shores* after *Storms*, I dare undertake they will not loſe their Labour. But to return. That Amber is not only lodged in the *Strata* of Earth, and of Sand together with the other mineral Nodules, but is ſometimes found actually growing unto, and combined into the ſame Maſs ‖ with the *Pyrites*, and others of them. That it likewiſe ſometimes contains in it pieces of Straws, Flies, Shells, and other heterogeneous Bodies, in like manner as the *Pyritæ*, Flints, and all other analogous Foſſils do †. That although Amber be moſt commonly of a yellowiſh Colour, and therefore not unlike ſome kinds of Gums, yet there is found of it alſo of ſeveral other Colours, as black, white, brown, green, blue, and purple, to name no more. Yea the very ſame Lump is frequently of different Colours. That theſe Colours are all accidental, even the yellow it ſelf, and owing to the Intermixture of foreign Matter, which concreted into the ſame Maſs with the proper Matter of this Stone, and with the heterogeneous

‖ *Vid. Conſ.* 2. ſupra.

† *Ibid.*

neous Bodies which are included in it, at the time of its Coalition †. That this is the Caſe of Agates, of Cornelians, of Topazes, and many other coloured Stones; the *Colours* of ſeveral whereof, and even *that* of Amber it ſelf, may by a very eaſie proceſs, be in great meaſure, if not wholly, extracted, and taken from them: and the Bodies of theſe Stones rendered almoſt, if not quite, as pellucid as Cryſtal, without ſenſibly damaging the Texture of them. That even the moſt obvious and ordinary Minerals are not free from this Contagion of adventitious Matter: Common Salt it ſelf, when found naturally cryſtallized amongſt other Minerals and Metalls, in the perpendicular Intervalls of the *Strata* of Stone, being, not only pellucid, as it naturally is when pure and ſimple, but white alſo, and like the white cryſtallized Spar: yellow, and nearly reſembling the Topaz: blue, and not unlike the Saphire; and yet theſe ſpecious Bodies, and Gemms as to outward ſhew, upon tryal, yield nothing but meer Salt, with an ex-

tremely

† Ibid.

tremely ſmall Admixture of other Matter, which gave them their Tincture. Which may ſerve for a further Inſtance of the confuſed ſtate of Minerals in the Earth: and of the Uncertainty of their Colours and Figures †.

† *Conf.* *Pag.* 172. & *Pag.* 174.

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# PART V.

## *Of the* Alterations *which the Terraqueous Globe hath undergone ſince the time of the Deluge.*

IT now remains that we take a view of the *Poſtdiluvian State* of this our Globe: that we examine how it hath ſtood for this laſt four thouſand years: that we enquire what Accidents have befallen it, and what *Alterations* it hath ſuffered ſince that wonderful Change it underwent at the Deluge.

There have been ſome who have made a mighty Outcry about Changes and Alterations in the Terraqueous Globe. The Pretences and Pleas of each I conſider in the firſt Part of this Eſſay: ſhewing that they are without any juſt ground: and that there are no Signs or Footſteps, in all the whole Globe, of any ſuch Alterations. And indeed 'tis well for the World that there are not; for the Alterations which they have fancied are ſuch as turn all the wrong way: ſuch as are without uſe, and have no end at all, or, which is worſe than none, a bad one: and tend to the *damage* and *detriment* of the *Earth* and its *Productions*.

Notwithſtanding, ſome Alterations there are which it hath, and doth ſtill undergo. This is what we may pronounce with Certainty: and there want not Inſtances enough ſufficiently to vouch and atteſt it. But theſe Alterations are of a quite different Strain: theſe are as *amicable* and *benificent* to the *Earth* and *Terreſtrial Bodies*, as the other, were there really any ſuch, would be pernicious and deſtructive to both. I have already * given ſome Intimations of the Changes which happen in the *interiour* parts of the Earth, I mean the Tranſitions and Removes of Metalls and Minerals there: and ſhewn of what *uſe* and *advantage* thoſe Changes are to the *World* †. So that I may now paſs freely on to conſider thoſe which befall the *exteriour*, or Surface of it. And *theſe* are brought about ſilently and inſenſibly; and, which is the conſtant Method of Nature, with

* *Part* 4. *Conſ.* 4.

† *Ibid.* *Conſ.* 9.

all imaginable Benignity and Gentleneſs. Here is none of the Hurry and Precipitation: none of the Bluſtering and Violence: no more than any of the direful and ruinous Effects, which muſt needs have attended thoſe *Suppoſititious* Changes. And as theſe Alterations are not *great*, ſo neither are they *numerous*. I have made careful ſearch on all hands, and canvaſs'd the Matter with all poſſible Diligence, and yet there are none that I can advance from my own Obſervations, but

1. That the upper or outermoſt *Stratum* of Earth: that *Stratum* whereon Men and other Animals tread, and Vegetables grow, is in a perpetual Flux and Change; this being the common Fund and Promptuary that ſupplies and ſends forth Matter for the Formation of Bodies upon the face of the Earth. That all Animals, and particularly Mankind, as well as all Vegetables, which have had *Being* ſince the Creation of the World, derived all the conſtituent Matter of their Bodies, ſucceſſively, in all Ages, out of this Fund.

That the Matter which is thus *drawn* out of this *Stratum* for the Formation of theſe Bodies, is at length laid down again in it, and *reſtored back* unto it, upon the Diſſolution of them; where it lies ready to be again aſſumed, and educed thence for the fitting forth of other like Bodies in a continual *Succeſſion.*

That the conſtituent Matter of any one Body being proper, and turning thus naturally, when again refunded into this *Stratum*, to the Conſtitution of another like Body, there is a kind of Revolution or *Circulation* of it; ſo that the Stock or Fund can never poſſibly be exhauſted, nor the Flux and Alteration ſenſible.

That as the Bodies which ariſe out of this Fund are *various*, differing very much, not only from one another, but the Members, Organs, or Parts of each individual amongſt themſelves: ſo likewiſe is the Matter of this Fund whereof they all conſiſt. For though when confuſedly blended and mingled, as it is whilſt lying in this *Stratum*, it may put on a Face never ſo uniform and alike, yet it is in reality very different, and conſiſts of *ſeveral Ranks*, *Sets*, or *kinds* of *Corpuſcles*.

That all the Corpuſcles that are of the *ſame Set*, or *Kind*, *agree* in every thing, and are moſt exactly like unto each other in all reſpects: but thoſe that are of *diverſe kinds, differ* from one another, as well in Matter or Subſtance, in Specifick Gravity, in Hardneſs, in Flexibility, and ſeveral other ways, as in Bigneſs and Figure. That from the various *Compoſures* and Combinations of theſe Corpuſcles together, happen all the Varieties of the Bodies formed out of them: all their Differences in Colour and outward Appearance, in Taſte, in Smell, in Hardneſs, in ſpecifick Gravity, and all other Regards; in much the ſame manner as that vaſt variety we ſee of Words ariſes from the various Order and Compoſition of the twenty four Letters of the Alphabet. But of this Matter, and of the Proceſs and Method of Nature in the Formation of Bodies out of it, I ſhall treat more at large in the *Diſcourſe it ſelf:* wherein I ſhall alſo conſider the Opinions of *Others*, particularly the *Ancients*, and, amongſt the reſt, of *Thales* and *Pythagoras*, about the *Elements* or *Principles* of Natural Things: for I now haſten to propoſe the other Alterations that happen in the Terraqueous Globe.

That

2. That *Rocks*, *Mountains*, and the other Elevations of the Earth, (eſpecially thoſe whoſe Surfaces are yearly ſtirr'd and diſturbed by digging, plowing, or the like) ſuffer a continual Decrement, and *grow lower* and lower; the ſuperficial parts of them being by little and little waſh'd away by *Rains*, and *born down* upon the ſubjacent Plains and Valleys. That even the *Stone* it ſelf (whether naked, and uncovered as in *Rocks*, or inveſted with a *Stratum* of Earth as is that in our ordinary Hills) is not, by its Solidity, priviledg'd and ſecured againſt them, but is diſſolved by degrees, and waſh'd alſo down, in its turn, as well as the looſer Earth.

3. That the Matter which thus devolves from the Hills down upon the lower Grounds, does not conſiderably *raiſe* and *augment* them; a great *part of it*, viz. the vegetative and lighter Terreſtrial Matter, being either mounted up into the Atmoſphere by the aſcending Vapour *, or carried along with the Rain-water into Rivers, and, by them, into the Sea †; whence 'tis returned back again to the Earth diſperſedly by Rain †, and ſerves for the

* *Vid. Part* 3. *Sect.* 1. *Conſ.* 8.

† *Confer. Pag.* 47. *& ſeq. uti & Pag.* 128. *& ſeq.*

Nutriment and Formation of the Plants which grow thereon: and *the reſt* of it, being more craſs and ponderous, does not move far, but lodges in the Clefts, Craggs, and ſides of the Rocks or Mountains, and at or near the Roots or Bottoms of them.

4. That the Stone of Rocks and Mountains being by degrees in this manner diſſolved, and the Sand born off, the *Shells*, and other Marine Bodies which were originally included therein *, are by that means let looſe, turned out, and expoſed upon the Surface of the Earth. That 'tis for this reaſon that theſe Marine Bodies are now moſt commonly found upon Hills, and the higher Grounds; thoſe few which are found below and at the bottoms of them, being for the moſt part only ſuch as have fallen down from above, and from the tops of them; thoſe which were, at the time of the Deluge, repoſed upon the Surface of the Earth, being moſt of them periſh'd and gone ‖: and indeed theſe, which are yet exiſtent, only accidentally preſerved by their being at firſt encloſed in the *Strata* of Stone, and ſo ſecured by it as long as it was it ſelf ſecure, I mean, untill

* Part 2. Conſ. 3.

‖ Vid. Pag. 65. & 66. ſupra.

untill it was thus diſſolved, and ſo could not any longer contribute any thing to their Preſervation.

5. That theſe *Shells* and other Bodies, being thus turned out of the Stone, and expoſed looſe upon the Surface of the Earth, to the Injuries of Weather, and of the Plough, to be trod upon by Horſes and other Cattel, and to many other external Accidents, are, in tract of time, *worn*, fretted, and *broken* to pieces.

That the Shells being ſo broken, ſtruck off, and gone, the *Stone included* in them is thereby *diſcloſed* and ſet at liberty; which Stone conſiſts of the *Sand* wherewith the Cavities of thoſe Shells were filled when they were ſuſtained together with it in the Water at the Deluge ‖, and which at length ſubſided in them, and was lodged with them in the *Strata* of Sand-ſtone; the Sand contained within the Shell becoming *ſolid* and conſiſtent at the ſame time that the ambient, or that of the *Stratum* without it, did †.

That therefore the Shells ſerved as *Plaſms* or *Moulds* to this Sand; which, when conſolidated, and afterwards in tract of time by this means freed from its

‖ Part 2. Conſ. 2. & 3.

† Part 2. Conſ. 4.

its inveſtient Shell, is of the ſame ſhape and ſize as is the Cavity of the Shell, of what kind ſoever that Shell happened to be. That this is the true Origin of thoſe Stones (conſiſting of Sand *) which are called, by Authors, *Cochlitæ*, *Conchitæ*, *Muitæ*, *Oſtracitæ*, *Ctenitæ* ‖, &c. and which are of conſtant, regular, and ſpecifick Figures; as are the *Cochleæ*, *Conchæ*, and the other Shells in which they were *moulded*, and from which, by reaſon of their ſo near reſemblance of the inſides of them, they borrow their ſeveral Denominations.

* *Thoſe which conſiſt of Spar, Flint,*&c. *I have conſidered above,* Part 4. Conſ. 2.

‖ *Vulgarly* Pectinitæ.

6. That theſe *formed Stones* being by this means deſpoiled of their Shells, and expoſed naked, upon the Surface of the ground, to the Injuries before recited, do alſo themſelves in time decay, wear, and moulder away, and are frequently found defaced and broken to pieces: in like manner as the *Strata* of Stone wherein they were originally lodged firſt did: and afterwards the Shells wherein theſe Stones were encloſed and formed.

This *Deterration*, as 'tis called, or Devolution of Earth and Sand from the Mountains and higher grounds, is not in equal quantity and alike in all places, but *varies* according to the different *height* of thoſe Mountains, and to the *extent* of the Plane at top of them: to the different *conſiſtence* and durableneſs of the *Strata* whereof they conſiſt: and according as they are more or leſs diſturbed by *Showers* †, *Ploughing*, or other *Accidents*. Nay this Deterration varies in different parts of even the ſame Mountain; thoſe which lye nearer to the Brink or Margin of it ſuffering a quicker and greater Decrement than thoſe which are more remote therefrom, and towards the middle of it. But though this Devolution be thus different, 'tis not any where, even where greateſt, very conſiderable; and therefore does not make any great Alteration in the Face of the Earth. This I have learn'd from Obſervations purpoſely made in ſeveral Parts of *England*; and when I ſhall, in the larger Work, propoſe the *Standard* whereby I give Judgment of it, any one may preſently and eaſily inform himſelf of the quantity and meaſure of it, either here, or in any other part of the World.

† *Which are much more violent in ſome Countries than in others.* Vid. Part 3. Conſ. 8.

There are indeed ſome other *Caſualties* that the Globe is obnoxious unto;

ſuch as *Earthquakes*, and the burning Mountains, or *Vulcanoes*. But of theſe, I thank God, and the good Conſtitution of this happy Iſland, I have not had any opportunity of Obſervation: Yet ſomething I have to offer concerning theſe, and the Cauſes of them, from the Obſervations of others. Not that the Thing is ſo very material, or that they make ſuch havock of, and Alterations in, the Globe as ſome Men fancy. We have aſſurance from Hiſtory, that *Ætna* and *Veſuvius* have ſent forth Flames, by fits, for this two or three thouſand years, and no doubt but they have done ſo much longer; and yet we ſee both *Sicily* and *Campania*, the Countries wherein thoſe two Mountains ſtand, are ſtill where they were: nay the very Mountains themſelves are yet in Being, and have not ſuffered any conſiderable Diminution or Conſumption, but are at this day the two higheſt Mountains in thoſe Countries. What they have really ſuffered: by what means both *theſe*, and *Earthquakes*, are occaſioned: and what are their *Effects* upon the *Globe*, ſhall be fully and carefully conſidered in due place; from which Conſiderations it will appear, that even *theſe* have their uſes: and that, although they do make ſome leſſer Alterations in ſome few Parts of the Earth, and ſometimes moleſt and incommode the Inhabitants of thoſe Parts, yet the Agent, whereby both the one and the other is effected, is of that indiſpenſible *Neceſſity* and *Uſe* both to the Earth it ſelf, to Mankind, and to all other the Productions of it, that they could not ſubſiſt without it. I have already given ſome brief Intimations that *Winds* and *Hurricanes* at Land *, *Tempeſts* and *Storms* at Sea †, (things that have always been look'd upon with as evil an eye as Earthquakes, and pointed at as only diſaſtrous and miſchievous to the World) are yet not without a very neceſſary and excellent Uſe: the ſame have I alſo done concerning *Vulcano's* ‖; but I muſt not dwell upon theſe things too long, wherefore I ſhall only now diſpatch what is further neceſſary to be hinted here about this *Decrement* of Mountains, and then conclude this Part.

* *Part* 4. *Conſ.* 14. *pag.* 215.

† *Part* 1. *Pag.* 49.

‖ *Part* 3. *Sect.* 1. *Conſ.* 13.

And *this*, as it does not make any great Alteration, ſo neither doth that, which it really does make, any ways *endamage* or diſorder the Globe: nor is it any the leaſt Detriment or Diſadvantage to the Productions of it, to Vegetables, to Animals, and particularly to Mankind: nor does it thwart and interfere with the grand Deſign of Providence, *viz.* the *Conſervation* of the Globe, and the Propagation of Bodies upon it, for the uſe of Man. So far from this, that it is very highly beneficial and ſerviceable to both; which will further appear if we conſider,

That in the firſt Ages after the Deluge, when the number of Mankind, of Quadrupeds, and of the other Animals was but ſmall, the Vallies and Plains were more than ſufficient for their Habitation and Uſe. And, by ſuch time as that Stock of them was enlarged, that they were further ſpread and multiplied, and thereby the Earth ſo far peopled and repleniſh'd that the Hills and higher Grounds began to be needed; thoſe Rocks and Mountains which in the firſt Ages were high, ſteep, and craggy, and conſequently then inconvenient and unfit for Habitation, were by this continual Deterration brought to a lower pitch, rendered more plain and even, and reduced nearer to the ordinary Level of the Earth; by which means they were made habitable by ſuch time as there was occaſion for them, fit for Tillage, for the Production of Vegetables, of Corn, and other Neceſſaries, for the uſe of their Inhabitants.

That although the *principal Intention* in the Precipitation of the Vegetative Terreſtrial Matter *, at the Deluge, and the burying it in the *Strata* underneath amongſt the Sand, and other mineral Matter, was to *retrench* and abridge the *Luxury* and Superabundance of the Productions of the Earth, which had been ſo ingratefully and ſcandalouſly abuſed by its former Inhabitants, and to cauſe it to deal them forth for the future more frugally and ſparingly; yet there was a ſtill *further Deſign* in that Precipitation: and the Matter ſo buried was to be brought up upon the Stage once more; being only reſerved in ſtore for the benefit of Poſterity, and to be, by this Deterration, fetch'd out to light again to ſupply the Wants of the latter Ages of the World. For had theſe *Strata* of Stone, and other mineral

* *Part* 2. *pag.* 89, 90.

neral Matter, which lay then underneath, been altogether deſtitute of this Vegetative Intermixture, and had not contained ſome, though a ſmaller and more parſimonious Supply of it in them: had there not been alſo vaſt numbers of Shells, Teeth, Bones, and the like, lodged in them, which are, when rotted and diſſolved, || a proper and natural Manure to the Earth, as all Parts whatſoever of Animals, as well as Vegetables, are; they conſiſting of ſuch Matter as the upper and Vegetative *Stratum* it ſelf contains, and therefore ſuch as is fit for the Conſtitution of Plants and of Animals *; I ſay, had it not been for this, when the upper and Vegetative *Stratum* was once waſh'd off, and born down by Rains, the Hills would have become all perfectly barren, the *Strata* below yielding only meer ſteril and mineral Matter, ſuch as was wholly inept and improper for the Formation of Vegetables. Nay, the Inconvenience would not have ſtop'd there, but have ſpread it ſelf much further. For, the Vegetative *Stratum* being carried off, and the Devolution ſtill continuing, the Matter of the lower or mineral *Strata* being

|| *Vid. Conſect.* 5. ſupra.

* *Confer. Conſ.* 1. *ſupra.*

being likewiſe by degrees borne down ſucceſſively to the Roots and Bottoms of the Hills, and upon the neighbouring parts of the Valleys and Plains, it would, as far as it reach'd, have cover'd and buried the upper and vegetative *Stratum*, that was expanded over thoſe Valleys and Plains; and render'd as much of them as it ſo covered alſo fruſtrate, ſteril, and unfruitful. So that by this means, in the latter Ages of the World, when the Earth ſhould be fully peopled, and all Quarters and Corners of it ſtock'd with Inhabitants, and when conſequently there would be the greateſt need and occaſion for its Productions every where, for ſupply of the Neceſſities of theſe its numerous Inhabitants, there would have been then much leſs than ever, a great part of the Earth being rendered entirely barren; ſo that they might have e'en ſtarved, had it not been for this Providential *Reſerve*: this Hoord, if I may ſo ſay, that was ſtowed in the *Strata* underneath, and now ſeaſonably diſcloſed and brought forth.

# PART VI.

## *Concerning the State of the Earth, and the Productions of it, before the Deluge.*

THE Thread of this Diſcourſe draws now near to an End; and I have reaſon to fear that, by this time, the Reader, as well as my ſelf, thinks it high time that it were quite ſpun out. For which reaſon I ſhall not any longer preſume upon his Patience farther than needs I muſt.

In the five foregoing Parts of this Eſſay I lay down what I have to propoſe relating to the Condition of the Earth during the time of the Deluge, and ever ſince that time. And here I am to make a Stand: to look a great way back: and make ſome Reflections upon the Poſture of Things before the Deluge.

The Method I take may perhaps be cenſured by ſome as prepoſterous, becauſe I thus treat laſt of the *Antediluvian* Earth, which was firſt in order of Nature. But they will, I hope, let fall that Cenſure, when they are acquainted that 'tis a thing of Conſtraint, and not of Choice: and that 'twas for want of Footing, and good ground to go upon, that I did not take that Earth under Conſideration ſooner. The truth is, there was no way for me to come to any competent Knowledge of it, or to give any ſure Judgment concerning it, but meerly by Induction: and by Contemplation of the Shells, Bones, and other Remains of it, which are ſtill in being. Now before I could inferr any thing from *theſe*, it lay upon me to make out that they all belonged to the Earth, and were the genuine Products of it: to ſhew likewiſe how they became buried and diſpoſed in the manner we now find them: and by what means they were preſerved till now. And that is what I have been hitherto about; ſo that this is indeed but the ~~proper pla~~ce for this Diſquiſition concerning the *Antediluvian* Earth: and more or leſs, troubled with Earthquakes; yet, were theſe *Vulcano's* wanting, they would be much more troubled with *them* than now they are: yea in all probability to that degree, as to render the Earth, for a vaſt ſpace around them, perfectly uninhabitable. In one word, ſo beneficial are *theſe* to the Territories where they are, that there do not want Inſtances of *ſome* which have been reſcued and wholly delivered from Earthquakes by the breaking forth of a new *Vulcano* there; this continually diſcharging that Matter, which, being till then barricaded up, and impriſoned in the Bowels of the Earth, was the occaſion of very great and frequent Calamities. That moſt of theſe Spiracles perpetually and at all Seaſons ſend forth Fire, more or leſs; and though it be ſometimes ſo little that the Eye cannot diſcern it, yet even then, by a nearer Approach of the Body, may be diſcovered a copious and very ſenſible Heat continually iſſuing out.

14. That the *Thermæ*, *Natural Baths*, or *Hot-Springs*, do not owe their Heat to any Collu&ation or Effervefcence of the Minerals in them, as ſome Natu-

ralists have believed: but to the before-mention'd *Subterranean Heat* or Fire. That theſe Baths continually emit a manifeſt and very ſenſible Heat: nay ſome of them have been obſerved at ſome times to ſend forth an actual and viſible Flame. That not only theſe, but all other Springs whatever, have in them ſome degree of Heat*, (none of them ever Freezing, no not in the longeſt and ſevereſt Froſts) but more eſpecially thoſe which ariſe where there is ſuch a Site and Diſpoſition of the *Strata* within the Earth as gives free and eaſie Admiſſion to this Heat, and favours its Aſcent to the Surface; where perſpiring forth at the ſame Outlets with the Water of the Spring, it by that means heats it, more or leſs, as it chanceth to be diſpenſed forth in greater or leſſer quantity. That as the Heat of all Springs is owing to this ſubterraneous Fire, ſo wherever there are any extraordinary Diſcharges of this Fire, there alſo are the neighbouring Springs hotter than ordinary; witneſs the many Hot-Springs near *Ætna*, *Veſuvius*, *Hecla*, and all other *Vulcanoes*. That the Heat of the *Thermæ* is not conſtant, and always alike; the

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* *It is indeed by this very heat that their Water is borne unto them from out the Abyſs.* Vid. *Conſ.* 8. ſupra.

been otherwiſe needleſs and ſuperfluous: which are directly levelled againſt theſe Miſtakes: and evince that whereever he hath receded from the *Moſaick* Account of *that Earth*, he hath at the ſame time alſo receded from Nature, and Matter of Fact; and this purely from the aforeſaid Obſervations; from which I ſhall prove,

1. That the Face of the Earth, before the Deluge, was *not ſmooth*, eaven, and uniform: but *unequal*, and diſtinguiſh'd with *Mountains*, *Valleys*, and *Plains*: as alſo with *Sea*, *Lakes*, and *Rivers*.

2. That the *Quantity* of *Water* upon the Surface of the Globe was nearly the ſame as now: the *Ocean* of the ſame *Extent*, and poſſeſt an equal ſhare of the Globe; intermixing with the Land ſo as to checquer it into Earth and Water, and to make much the ſame Diverſities of Sea and Land that we behold at preſent.

3. That the Water of the Sea was ſaturated with *Salt*, in like manner as now it is: that it was agitated with *Tides*, or a Flux and Reflux: with Storms, and other Commotions.

4. That the Sea was very abundantly *repleniſhed with Fiſh* of all kinds: as

well of the cartilaginous and ſquammoſe, as of the teſtaceous and cruſtaceous kinds: and that the *Lakes* and *Rivers* were as *plentifully* furniſh'd with Lake and River-Fiſh of all ſorts.

5. That the Earth was very *exuberantly* beſet with *Trees*, *Shrubs*, and *Herbs*: and ſtock'd with *Animals* of all ſorts, *Quadrupeds*, *Inſects*, and *Fowls*: and this on all ſides, and in all parts of it, quite round the Globe.

6. That the Animal and Vegetable Productions of the *Antediluvian* Earth did not in any wiſe *differ* from thoſe of the preſent Earth. That there were then the very *ſame kinds* of Animals and Vegetables, and the ſame ſubordinate *Species* under each kind that now there is. That they were of the *ſame ſtature* and ſize, as well as of the *ſame ſhape*: their Parts of the *ſame Fabrick*, Texture, Conſtitution, and Colour, as are thoſe of the Animals and Vegetables at this day in being.

7. That there were both *Metalls* and *Minerals* in the *Antediluvian* Earth.

8. That the Terraqueous Globe had the *ſame Site* and Poſition in reſpect of the *Sun* that it now hath. That its *Axis* was not parallel to that of the

Ecliptick, but inclined in like manner as it is at preſent: and that there were the ſame Succeſſions of *Heat* and *Cold*, *Wet* and *Dry*: the ſame Viciſſitudes of *Seaſons*, Spring, Summer, Autumn and Winter, that now there is.

It hath been already noted, that theſe Propoſitions are founded on Obſervations made upon the Animal and Vegetable *Remains* of the *Antediluvian Earth.* From thoſe Remains we may judge what ſort of Earth *that* was: and ſee that it was not much different from *this* we now inhabit *. Now though 'tis not to be expected that I *here* formally lay down thoſe Obſervations, that being not the Buſineſs of *this Tract*, yet untill I have Opportunity both of doing ſo, and of ſhewing in what manner the foregoing Propoſitions flow from them, it may be very convenient that I give ſome ſhort Directions how the Reader, for his preſent Satisfaction, may, of himſelf, and without my Aſſiſtance, make out the principal Articles of theſe Propoſitions from the Obſervations already delivered in the ſeveral Parts of this Diſcourſe, and from one or two more that I ~~ſhall add~~ upon this Occaſion. And that he may

* Conf. *Pag.* 84. *& ſeq.*

at one View diſcover how conſonant the Account which *Moſes* hath left us of the Primitive Earth, is to *this* which we have from *Nature*, and how much the late *Theory of the Earth* differs from both, I will ſet down that Writer's Senſe of the Matter under each Head as we paſs along.

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To begin therefore with the *Sea*; That there was *one* before the Deluge, there needs not, I think, any other Proof than the Productions of it yet in being: the Shells, the Teeth, and Bones of Sea-Fiſhes ||. And for *Moſes*, he is not at all averſe hereto; but as expreſly aſſerts that there was then a Sea, as the *Theory* does, that there was none. Take it in his own words. † *And God ſaid, Let the Waters under the Heaven be gathered together unto one place, and let the Dry-land appear: and it was ſo. And God called the Dry-land Earth, and the gathering together of the Waters called he SEAS: and God ſaw that it was good.* And though the Theoriſt flatly denies that there was then any ſuch thing, yet he does not go about to diſpute the Tranſlation of this Paſſage, but readily owns *, that *Moſes* hath here *uſed a word that was com-*

*mon*

|| *Conf.* *Part* 2.

† *Gen.* I. 9, 10.

* *L.* I. *c.* 7.

*mon and known to ſignifie the Sea.* According to *him* therefore, we ſee the Sea was formed at the beginning of the World, and after its Formation approved of as *good*: that is, very neceſſary and ſerviceable to the Ends of Providence in the Kingdom of Nature; and this indeed it is ſo many ways, that it muſt needs be granted that *that* would have been a very wild World had it been without any Sea. The ſeparating of the Sea and Land, and determining the ſet Bounds of each, is here
† *Verſ.* 13. † reckoned part of the Work of the third Day: as the ſtocking of the Sea
‖ *Verſ.* 21, 22. with Whales and other Fiſhes, is ‖ of the fifth. *And God created great Whales,* &c. *and bleſſed them, ſaying, be fruitful and multiply, and fill the Waters in the SEAS.* And when on the ſixth Day the finiſhing Hand was ſet to the Work, and Man created, God gives him *Do-*
* *Verſ.* 28. *minion over the Fiſh of the SEA* *. 'Twould have been but a ſcanty and narrow Dominion, and *Adam* a very mean Prince, had there then been neither any Fiſh exiſtent nor Sea to contain them. Nay, this had been little better than a downright Illuſion and abuſing of him: and what is more,

*that World* had been ſo far from excelling *ours* in the Abundance of its Productions, which is what the Theoriſt contends for on another Occaſion, that 'twould have fallen far ſhort of it: have wanted a very noble and large ſhare of the Creation which we enjoy: been deprived of a moſt excellent and wholſome Fare, and very many delicious Diſhes that we have the uſe and benefit of. But the Caſe was really much otherwiſe: and we have as good proof as could be wiſh'd that there were not any of all theſe wanting. The things many of them yet extant ſpeak aloud for themſelves: and are back'd with an early and general Tradition. For *Moſes* is ſo far from being ſingular in thus relating that the Sea is of as old a *Date* and *Standing* as the Earth it ſelf is, that he hath all, even the firſt and remoteſt Antiquity of his ſide; the *Gentil Account* of the Creation making the *Ocean* to ariſe out of the *Chaos* almoſt as ſoon as any thing beſides. But we have in ſtore a yet further Teſtimony that will be granted to be beyond all Exception. 'Tis from the mouth of God himſelf, being part of the *Law* promulgated by him in a moſt ſolemn and extraordinary manner. Exod. 20. 11. *In ſix days the Lord made Heaven and Earth, the SEA, and all that in them is.* 'Tis very hard to think the Theoriſt ſhould not know this: and as hard that, knowing it, he ſhould ſo openly diſſent from it.

Then for the Dimenſions of the Sea; that it was as *large*, and of as great *extent* as now it is, may be inferr'd from the vaſt Multitudes of thoſe Marine Bodies which are ſtill found in all Parts of the known World †. Had *theſe* been found in only one or two places: or did we meet with but ſome few Species of them, and ſuch as are the Products of one Climate or Country, it might have been ſuſpected that the Sea was then, what the *Caſpian* is, only a great Pond or Lake, and confined to one part of the Globe. But ſeeing they are dug up at Land almoſt every where, and in at leaſt as great variety and plenty as they are obſerved at Sea: ſince likewiſe the foſſil Shells are *many of them* of the ſame kinds with thoſe that now appear upon the neighbouring Shores, and *the reſt* ſuch as may well be preſumed to be living at the bottom, or in the interiour and deeper Parts

† *Conſ. Pag. 6. & Part 2.*

Parts of the adjacent Seas †, but never any that are peculiar to remoter Seas or to the Shores of diſtant Countries, we may reaſonably conclude, not only that the Sea was of the ſame bigneſs and *capacity* before the Deluge, but that it was of much the ſame *form* alſo, and interwoven with the Earth in like manner as at this time: that there was Sea in or near the very *ſame places* or Parts of the Globe: that each Sea had its *peculiar Shells*, and thoſe of the *ſame Kinds* that now it hath: that there was the *ſame diverſity of Climates*, here warmer and more agreeable to the Southern Shells, there colder and better ſuited to the Northern ones: the ſame *variation of Soils*, *this* Tract affording ſuch a Terreſtrial Matter as is proper for the Formation and Nouriſhment of one ſort of Shell-fiſh, *that* of another: in few words, much the ſame Appearance of Nature, and Face of Things that we behold in the preſent Earth. But of this more by and by.

† Conf. Pag. 26. ſupra.

That the Water of the Sea was *ſalt*, as now it is, may be made out likewiſe from thoſe Shells and other the Productions of it; they being of the ſame Conſtitution, and conſiſting of the ſame ſort of Matter that do the Shells at this day found upon our Shores *. Now the Salt wherewith the Sea-water is ſaturated, is part of the Food of the Shell-fiſh reſiding therein, and a main Ingredient in the Make of their Bodies; they living upon this, and upon the Mud and other Earthy Matter there.

* Vid. pag. 22. & 23. ſupra.

And that the Sea *Ebbed and Flowed* before the Deluge, may be inferr'd, not ſo moch from the Neceſſity of that Motion, and the many and great Uſes of it in the Natural World †, as from certain Effects that it had upon the Shells, and other like Bodies yet preſerved. 'Tis known that the Sea, by this Acceſs and Receſs, ſhuffling the empty Shells, or whatever elſe lies expoſed upon the Shores, and bearing them along with it backward and forward upon the Sand there, frets and wears them away by little and little, in tract of time reducing thoſe that are concave and gibboſe to a flat, and at length grinding them away almoſt to nothing. And there are, not uncommonly, found Shells ſo worn encloſed, amongſt others, in Stone.

† Conf. pag. 48. & 156.

As the Sea-ſhells afford us a ſure Argument of a Sea, ſo do the River-ones of *Rivers* in the *Antediluvian* Earth. And if there were Rivers, there muſt needs alſo have been *Mountains*; for they will not flow unleſs upon a Declivity, and their Sources be raiſed above the Earth's ordinary Surface, ſo that they may run upon a Deſcent ||; the *Swiftneſs* of their *Current*, and the *Quantity* of *Water* refunded by them, being proportioned generally to the *height* of their *Sources*, and the *Bigneſs* of the Mountains out of which they ariſe. Mountains being proved, nothing need be ſaid concerning *Valleys*; they neceſſarily following from that Proof, as being nothing but the Intervalls betwixt the Mountains. But let us ſee what *Moſes* hath on this Subject *. *And the Waters* (he is treating of the Deluge) *pre-*

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|| Part 3. Sect. 1. Pag. 153. & 154. *The* Theoriſt, *I know, ſuppoſes both the Antediluvian and the preſent Earth to be of an Oval Figure, and protended towards the Poles, as thinking that ſuch a Figure would afford him a Plane ſo much inclined towards the Æquator, that the Rivers might flow upon it though there were no Mountains. But 'tis plain they could not. Nor are there any the leaſt Grounds to believe that the firſt Earth was of that Figure. If he had had any thing that had look'd like a Proof of it, he had done well to have produced it. But 'tis manifeſt though we imagine the Earth formed that way he propoſes, it would not have fallen into any ſuch Figure. And for the preſent Earth, 'tis of a Figure as different from that which he aſſigns as it well could be; it being a* Sphæroides Prolatus, *as appears from the late Diſcoveries concerning it.*

* Gen. vii. 19. *&* *ſeq.*

*prevailed exceedingly upon the Earth; and all the HIGH HILLS that were under the whole Heaven were covered. Fifteen Cubits upwards did the Waters prevail; and the MOUNTAINS were covered. And all fleſh dyed: --- all in whoſe Noſtrils was the breath of Life.* The *Theoriſt* averrs, that there were no Mountains in the *firſt Earth.* I am not willing to ſuppoſe that he charges a Falſhood or Miſtake upon the Paſſage, but rather that he would have *this* to be underſtood of thoſe Mountains which were raiſed afterwards. Which yet cannot be; for the Hiſtorian here plainly makes theſe Mountains the Standards and Meaſures of the *Riſe* of the Water; which they could never have been had they not been ſtanding when it did ſo riſe and overpour the Earth. His Intention in the whole is to acquaint us that all Land-Creatures whatever, both Men, Quadrupeds, Birds, and Inſects, periſh'd and were deſtroyed by the Water; *Noah* only excepted, *and they that were with him in the Ark.* And at the ſame time, to let us ſee the Truth and Probability of the Thing: to convince us that there was no way for any to eſcape, and particularly that none could ſave themſelves by climbing up to the tops of the Mountains that then were, he aſſures us that *they*, even the higheſt of them, were all covered and buried under Water. Now to ſay that there were then no Mountains: and that *this* is meant of Mountains that were not formed till afterwards, makes it not intelligible, and indeed hardly common Senſe.

The extreme *Fertility* of both Sea and Land before the Deluge, appears ſufficiently from the vaſt and almoſt incredible Numbers of their Productions yet extant *; not to inſiſt upon thoſe which are long ago rotted and gone †. Nor need we much wonder at this their *abundant Fruitfulneſs*, when we know from what Source it proceeded; which our Hiſtorian hath opened to us in very ſignificant words ‖. *And God ſaid, let the Waters bring forth abundantly the moving Creature that hath life*, &c. --- *And God bleſſed them, ſaying, be fruitful and multiply, and fill the Waters in the Seas: and let Fowl multiply in the Earth*, &c. Here was we ſee a Bleſſing, handed out with the firſt Pairs of Animals at the moment of

* *Vid. Part* 2.

† *Conf. Pag.* 32. 66. 77. & *Part* 3. *Sect.* 2. *Conf.* 11.

‖ *Gen.* i. 20. & *ſeq.*

their Creation, very liberal and extenſive; and it had effect with a Witneſs. A Man that does but behold the mighty Sholes of Shells, to take them for an Inſtance, that are ſtill remaining; and that lye bedded and cumulated in many places heap upon heap, amongſt the ordinary Matter of the Earth, will ſcarcely be able to believe his Eyes, or conceive which way *theſe* could ever live or ſubſiſt one by another. But yet ſubſiſt they did: and, as they themſelves teſtifie, well too; an Argument that *that Earth* did not deal out their Nouriſhment with an over-ſparing or illiberal Hand.

That theſe Productions of the *Original Earth, differ* not from thoſe of the *Preſent*, either in Figure, in Magnitude, in Texture, or any other reſpect, is eaſily learn'd by comparing of them. The exact *Agreement* betwixt the *Marine Bodies* I have ſhewn already *: and ſhall in due place ſhew the ſame of the *Terreſtrial ones.*

* *Pag.* 22, 23. *Conf. Gen.* i. 11, 12, 21, 24, 25. *&* vi. 20.

And as there were ſuch great Numbers of Animals and Vegetables in the *Primitive* Earth, ſo that there were alſo *Metalls* and *Minerals*, and theſe in no leſs plenty than in *ours*, is very clear from what hath been delivered in the Fourth Part of this Eſſay, which need not be repeated here. Nor is *Moſes* defective in this Point †. *And Zillah, ſhe alſo bare Tubal-Cain, an Inſtructer of every Artificer in Braſs and Iron.* The *Theoriſt*, quite contrary, ſays, *As for Subterraneous Things, Metalls and Minerals, I believe they had none in the firſt Earth; and the happier they; no Gold, nor Silver, nor coarſer Metalls.* Amongſt theſe coarſer Metalls are Copper, or Braſs, and Iron. Now if there were none of theſe, 'tis a great Myſtery to me, I confeſs, how *Tubal-Cain*, who certainly died either before or at the Deluge ‖, could ever have taught the Workmanſhip and Uſe of them. And yet if this Theory be true, there neither was nor could be any within their reach, or that they could ever poſſibly come at. For the truth of the Theory I am in no wiſe concerned: the Compoſer of it muſt look to that; but that there were really both Metalls and Minerals before the Deluge, is moſt certain. For beſides the Teſtimony that we have of the Thing from Nature, and the Paſſage already alledged out of *Moſes*, there is ano-

† *Gen.* iv. 22.

‖ *Confer. Gen.* vii. 23. & 1 *Pet.* iii. 20.

another for which we are alſo obliged to the ſame Author, that acquaints us there were *both* even in *Paradiſe* it ſelf. 'Tis in his ſecond Chapter *. *The name of the firſt* River *is* Piſon*: that is it which compaſſeth the whole Land of Havilah, where there is Gold. And the Gold of that Land is good: there is Bdellium and the Onyx-ſtone.* He ſpeaks here, I grant, only in the Preſent Tenſe, *there is Gold:* but muſt mean not only that there was Gold and Gemms there in his time, but that there was ſo likewiſe from the beginning of the World, of which he is giving an Account in theſe two Chapters, or, with Submiſſion, I conceive 'twould not be any thing to his purpoſe. He is here ſpeaking of *Paradiſe*; which he repreſents as a moſt charming and delightful Place: beſett with *every Tree that is pleaſant to the ſight, and good for food* ‖: watered with refreſhing Streams and excellent Rivers: and abounding with Things not only uſeful and convenient, but even the moſt rare and valuable, the moſt coſtly and deſirable: particularly *Gold*, *Precious Stones*, *and Perfumes*; which were all much eſteemed and admired by the Jews, to whom he

* *Gen.* ii. 11, 12.

‖ *Verſ.* 9.

he wrote this. Nor is it any Paradox, notwithſtanding that *Diſſolution* of the Earth which happened at the Deluge*, to ſuppoſe there was this or that Metall or Mineral in the ſame Part of the Globe afterwards where it was before *that* happened. The Water of the Abyſs indeed changed its Place, during the time: So did the Sea, and bore the Bodies it contained, many of them, out along with it. But for the Terreſtrial Parts of the Globe, Metalls, Minerals, Marble, Stone, and the reſt, they, though diſſolved, and aſſumed up into the Water, did not flitt or move far, but, at the general Subſidence, ſettled down again in or near the ſame Place from which they were before taken up. For the Water was all out upon the Face of the Earth before ever *theſe* ſtirr'd, or were fetch'd up out of their native Beds: and they were all ſunk down into the ſame Beds again, before the Water began to ſhift away back to its old Quarters; ſo that it could not contribute any thing to the Removal of them. Even the very Vegetables, and their Seeds, which were many of them naturally lighter than the Water, aſſiſted by the heavier

* *Part* 2.

heavier Terreſtrial Matter that had in this Jumble and Confuſion faſten'd and ſtuck to them, fell all to the bottom: and the Water was in great meaſure clear, and diſengaged from the Earthy Maſs, before it went off. And 'twas well it was ſo; for had the Mineral Matter of the Globe not been held to its former Station, but hurried about and tranſpoſed from place to place, 'tis ſcarcely to be conceived how many and great Inconveniences it would have occaſioned. The ſame likewiſe for Vegetables. Had the Seeds of the Pepper Plant, the Nutmeg, the Clove, or the Cinnamon Trees, been born from *Java*, *Banda*, the *Moluccoes*, and *Ceylon*, to theſe Northern Countries, they muſt all have ſtarved for want of Sun: or had the Seeds of our colder Plants ſhifted thither, they wou'd have been burnt up and ſpoil'd by it. But *Things* generally kept to their proper Places: to their old natural Soil and Climate; which had they not done, all would have been confounded and deſtroyed. 'Tis true, the Vegetables, being comparatively lighter than the ordinary Terreſtrial Matter of the Globe, ſubſided laſt †; and conſequently

† *Confer.* P rt 2. Conſ 8. 3.

ſequently lying many of them upon the Surface of the Earth, thoſe which were of conſiderable Bulk, as the bigger ſorts of Trees, which had large and ſpreading Heads, would lye with their Branches ſtretch'd up to a great height in the Water, (and, when *that* was withdrawn in the Air ||,) and ſo being very much in the Waters way, when it began to depart and retire back again, would be apt to be removed and driven forward along with it, eſpecially thoſe which lay in ſuch places where the Current happened to run ſtrong. Accordingly we now find of theſe Trees in Iſlands, and the other bleaker and colder Parts of the Earth, where none now do, or perhaps ever did, grow *. And there they are of mighty uſe to the Inhabitants, affording them a Supply of Timber which their own Country doth not yield, and which they employ not only for Fewel, which yet is much needed in thoſe cold Countries, but for Building likewiſe, and many other Purpoſes; whereas in the Places whence they were thus driven they would have been uſeleſs, yea but an Incumberance, and might be eaſily ſpared, for as long as the *Seeds*

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|| *In which Poſture 'tis probable the* Olive-Tree *lay from which the Dove pluck'd off the* Leaf *that ſhe brought unto* Noah, *Gen.* viii. 11.

* *Conf. pag.* 113. ſupra.

remained behind, lodged in a natural and agreeable Soil, all was ſafe enough: *they* would ſoon vegetate, and ſend forth a *new* Sett of Trees there, ſo that 'twas not much matter what became of the Old ones. But to the Parts whereunto they were thus removed, they are of great advantage. And, which is in truth very remarkable, and an Argument that there was ſomething more than meer Chance in this Affair, there are hardly any Countries that are deſtitute of Timber of their own growth, which have not a very large Supply of theſe Stray-Trees, if I may ſo call them. But to proceed. After that the Terreſtrial Matter was once ſunk down into its ſeveral Beds, and well ſettled there, the Mountains were caſt up, and the Springs and Rivers burſt forth, in ſuch Numbers, and at ſuch Diſtances from one another, in all Parts of the Globe, as beſt anſwered the Neceſſities and Expences of *each*: and therefore undoubtedly in much the ſame Places that they were before the Deluge. All Things were ſo contrived and ordered in the re-fitting up the Globe at this time, that they might beſt execute and perform each their ſeveral Ends and Offices. There were the ſame Meaſures taken, and the ſame Proceſs uſed in this Re-formation of it, that were when 'twas firſt built: and much ſuch an Earth aroſe out of the *Deluge*, as at the Creation, ſprung out of Nothing ||. But the Reader will more clearly diſcover all this, with the Reaſons of it, if he give but himſelf the trouble to compare *Part* 2. *Conſ*. 2. *& ſeq. Part* 3. *Sect*. 1. *pag*. 154. *& ſeq. & Sect*. 2. *Conſ*. 2, 3, *&* 7. *Part* 4. *Conſ*. 3. *& Part* 6. *Conſ*. 9. This premiſed, 'twould be, I think, not ſtrange ſhould we find *Paradiſe* at this Day where *Adam* left it: the ſame Rivers: the ſame Face of the Ground: the ſame *Metalls* and *Minerals*, that then there were. And I the rather Note this, becauſe I ſee there are ſome ſo earneſt in queſt of it. Learned Men have been now a long time a ſearching after the happy Country from which our firſt Parents were exiled. If they can find it, with all my heart: and there have been ſome that have ſought it with that Induſtry that I think they deſerve it for their pains whenever they make the Diſcovery.

|| *Vid. pag.* 97. *ſupra.*

To deal freely, I am of opinion there's no part of the preſent Earth that does come up fully to the *Moſaick* Deſcription of Paradiſe. The Country about *Babylon*, or *Bagdet*, bids faireſt for it: and I am perſuaded that it was thereabouts. But if ſo, whoever ſhall compare this Country, as now it ſtands, with *that* Deſcription, will find that it ſuſtained ſome Alterations from the Deluge, perhaps more than any Part of the Earth beſides. And there's an obvious Reaſon why it ſhould. There was a Paradiſe before, but was to be none after the Deluge. The Caſe was altered, and the Reaſon of the thing ceaſed. So that *all* that denominated it Paradiſe, and that diſtinguiſh'd it from the reſt of the Globe, was lop'd off by the Deluge, and *that* only left which it enjoyed in common with its neighbour Countries. Upon the whole, 'tis, I think, apparent that what I offer in this Diſcourſe is ſo far from doing any Diskindneſs to the Cauſe theſe Gentlemen are, and have been ſo long, engaged in, that it does them a real Service, and helps them out with the main thing whereat they ſtuck: fairly ſolving all Difficulties in the *Moſaick* Relation of Paradiſe. Wherefore now to proceed to the laſt Head to be diſcuſs'd, the Viciſſitude of Seaſons, Summer and Winter, Hot and Cold, in the *Antediluvian* World.

And that there really was ſuch a *Viciſſitude* we need not go any further, for proof than to the aforeſaid Animal and Vegetable Bodies ſtill preſerved; the general Tenour of them ſpeaking it out ſo plainly as to leave no room for doubt. There are, we know, ſome ſorts of Vegetables which conſiſt of Particles very fine, light, and active: and which therefore require only a ſmaller degree of Heat to raiſe them * from out the Earth up into the Seeds, Roots, or Bodies of thoſe Vegetables, for their growth and nouriſhment. So that for the raiſing of *theſe*, the Suns Power, when only leſſer, is ſufficient. And therefore they begin to appear in the earlyer Months, in *February* and *March*; when they firſt peep forth of the Ground: after a while they diſplay themſelves, ſhewing their whole Tire of Leaves: then their Flowers: next their Seeds: and laſtly

* *Vid.* Part 3. Sect. 1. Conſ. 8. Pag. 125.

laſtly when, in the following Months, *April* and *May*, the Sun is further advanc'd, and (to ſpeak in the Phraſe of the Vulgar, which I chooſe all along for the ſake of plainneſs) hath gained a greater ſtrength, the Heat becomes too powerful and boiſterous for them; it now mounting up the Terreſtrial Matter with ſuch force and rapidity, that the Plants cannot aſſume that part of it which is proper for their Nouriſhment, as it paſſeth through them, nor incorporate it with them, as before they were wont when it paſs'd more gently and leiſurely. Nay the Heat at length grows ſo great, that it again diſſipates and bears off thoſe very Corpuſcles which before it brought; the Parts of theſe Plants being very tender, as conſiſting of Corpuſcles which are extremely ſmall and light, and therefore the more eaſily diſſipable. So that then theſe Plants dye away, ſhrink down again into the Earth, and all, ſave only their Roots and Seeds, vaniſh and diſappear. But when the Sun's Heat is thus far advanc'd, 'tis but juſt come up to the pitch of another Sett of Vegetables:

and but great enough to excite and bear up the Terreſtrial Particles, which are more craſs and ponderous. And therefore thoſe Plants which conſiſt of *ſuch*, begin then to ſhoot forth, and diſplay themſelves. So that the Months of *April* and *May* preſent us with another Crop and *Order* of Plants. For the ſame reaſon alſo, *June*, *July*, and *Auguſt* go farther, and exhibit a ſtill different Shew of Vegetables, and Face of Things. But when, in the Months of *September* and *October*, the Sun's Power is again diminiſh'd, and its Heat but about equivalent to *that* of *March* and *April*, it again ſuits the Plants which were *then* in ſeaſon, ſo that they many of them ſpring up afreſh in *theſe* Months, and flouriſh over a-new, in like manner as before they did in *thoſe*; till being check'd by the Cold of the ſucceeding Winter, the Sun being gone off, and having now no longer Power great enough to bring up and ſupply them with freſh Matter, they preſently begin to decline for want thereof, and at length quite dwindle away and diſappear, untill the Arrival of the Spring-Seaſon, when they take their *Turns* over again as formerly. Yea the more tender and frigitive Parts, the Leaves, and the like, of many of the more ſturdy and vigorous Vegetables, Shrubs, and Trees, ſuffer the ſame Fate, and fall off for want of the Supply from beneath; thoſe only which are more tenacious, conſiſtent, and hardy, enduring the Brunt, and making a ſhift to ſubſiſt for the time without ſuch Recruit and Reparation. 'Tis therefore, we ſee, moſt apparent that this Succeſſion of *Things* upon the Face of the Earth, is purely the Reſult and Effect of the Viciſſitude of Seaſons: and is as conſtant and certain as is the Cauſe of that Viciſſitude, the Sun's Declination; ſo certain, that were a Man kept for ſome time blindfold, in ſuch manner that he could have no Notice how the Year paſs'd on, and were at length turn'd forth into the next Field or Garden, he would not need any other Almanack to inform him what Seaſon of the Year it then was.

But if inſtead of this *Variation* of Heat, we ſuppoſe that there was an *Equality* or conſtant Temperature of it before the Deluge, which is what the *Theoriſt* contends for, the Caſe would be very much altered, and *that* altogether for the worſe. A Man can hardly at firſt imagine what a Train of ill Conſequences would follow from ſuch a Condition and Poſture of Things; of which 'twould not be the leaſt that ſuch a Mediocrity of Heat would deprive the World of the moſt beautiful and the moſt uſeful Parts of all the whole Creation: and would be ſo far from exalting the Earth to a more happy and Paradiſiacal State, which is what he brought it in for, that 'twould turn it to a general Deſolation, and a meer barren Wilderneſs, to ſay no worſe. Such an Heat would be too little for ſome ſorts of Vegetables, and too great for others. The more fine and tender Plants, thoſe which will not bear a degree of Heat beyond that of *April*, would be all burnt up, and deſtroyed by it: whilſt it could never reach the more lofty and robuſt, nor would there be near Heat enough to ripen their Fruits and bring them to Perfection. Nothing would ſuit and hit *all*, and anſwer every End of Nature, but ſuch a gradual Increaſe and Decreaſe of Heat as now there is. I muſt not deſcend to the *Animal* World, where the Inconveniences would be as many and as great as in the *Vegetable*: and ſuch a Situation of the Sun and Earth as that which the *Theoriſt* ſuppoſes, is ſo far from being preferable to *this* which at preſent obtains, that this hath infinitely the Advantage of it in all reſpects.

Be that how it will, for I have no need to inſiſt upon it, but may take the thing in his way, and ſuppoſe that ſuch a Temperature would have all the happy Effects that he expects from it; yet there is one very conſiderable *Phænomenon* of the Vegetable Remains of *that Earth*, which affords us a ſure and plain Indication that there was not then any ſuch Temperature. From *theſe* it clearly appears that there was the ſame Order and Succeſſion of Things upon the Face of the Earth that there is at this time. Now this Succeſſion being, as we have ſeen, cauſed meerly by the Variation of the Sun's Heat, it muſt needs follow, that there was *then* the ſame Variations of it, and conſequently the ſame Alternations of Seaſons, that *now* there is. Had there been an Equality of Heat, if we grant that it could have produced all the Plants in Nature, which 'tis impoſſible it ever ſhould, it muſt have done it indifferently and uncertainly. There could be no reaſon why they ſhould flouriſh at any one ſet time rather than another; that's peculiarly the Effect of the Sun's Variation. So that they muſt needs have been all in Confuſion, and this Succeſſion of Things would have been quite overturned. The Plants which now appear in the moſt different and diſtant Seaſons, would have been all in Prime, and flouriſhing together at the ſame time: ſo that they would have had *February* and *May*, *July* and *September*, all in one Scene. Nay, the ſeveral Individuals of the ſame kind muſt have been as greatly at odds: one arrived to Seed, and that fully ripe, and ready to ſhed, whilſt another was not ſo much as come to Flower, but in as differing a State and Hue as can be. In brief, there would have been all the Diverſity, Uncertainty, and Diſorder, in the Vegetable Kingdom that can well be conceived. Which indeed is no more than what he freely owns: telling us that then *Every Seaſon was a Seed-time to Nature, and every Seaſon an Harveſt*. This is what he does, and muſt grant: and this is as much as is needful for the overturning his Hypotheſis. For the Vegetable Remains of that Earth ſay no ſuch thing: they give not any the leaſt Countenance to theſe Conjectures, but the quite contrary: and *theſe*, being many of them encloſed in very fine and cloſe Stone, are preſerved to this day very curiouſly and entire to Admiration. By *them* we may eaſily judge how Things then ſtood. And there is ſo great an Uniformity, and general Conſent amongſt them, that from it I was enabled to diſcover what time of the year it was that the *Deluge* began [†]; the whole Tenour of theſe Bodies thus preſerved clearly pointing forth the Month

of

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[†] *Gen.* vii. 11. In the ſecond Month, the ſeventeenth day of the Month, -- were all the Fountains of the great Deep broken up, and the windows of Heaven were opened. Moſes *writing to the* Jews *his Country-men, makes uſe of the Form of the Year then received amongſt them,*

*which*

of *May* ||; nor have I ever met with ſo much as one ſingle Plant, or other Body, amongſt all thoſe vaſt multitudes which I have carefully view'd, that is peculiar to any other Seaſon of the Year: or any thing that happens earlier or later: any of them ſhort, or any further advanc'd in Growth, Seed, or the like, than they now uſually are in that Month; which ſurely I muſt needs have done, had there really been ſuch an equality of Seaſons, and conſtant temperature of Heat as is imagined by the Theoriſt. There are ſome *Phænomena* of the Animal Remains of *that Earth* which afford us more Arguments to the ſame purpoſe, and thoſe not leſs concluding than the others; but theſe I ſhall wholly wave for the preſent, there being indeed no occaſion to make uſe of them here.

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*which was indeed the firſt and moſt ancient, but had been diſuſed during the time of their Abode in* Egypt, *and but newly re-eſtabliſh'd when this was wrote* [Exod. xii. 2.] *In* this, Niſan, *or, as 'twas alſo call'd,* Adib *was the firſt Month: and* Ijar *the ſecond, upon the 17th day whereof the waters of the Deluge came forth, according to this Relation. And truly the time (which is not a little remarkable) falls within the Compaſs here chalk'd out by Nature ſo very punctually, that one can ſcarcely forbear concluding that theſe Strokes and Lines of Nature, and thoſe of that Relation, came both from the ſame Hand; but this only by the by. The Particulars of the Computation I here uſe ſhall be given at full elſewhere, they being too bulky for this place.*

|| *Conf. Part 3. Sect. 2. Conſ. 5.*

I ſhall now only look a little into the *Moſaick* Archives, to obſerve what they furniſh us with upon this Subject, and I have done; for I perceive I have, before I am aware, much exceeded the Meaſures I deſign'd, which on ſo copious a Subject 'twas hard not to do. Gen. 1. 14. *And God ſaid, let there be LIGHTS in the Firmament of the Heaven, to divide the Day from the Night: and let them be for Signs, and for SEASONS, and for Days and Years.* This Paſſage, we ſee, does not at all favour the Opinion that there was no Variation of Seaſons before the Deluge? ſo far from it, that ſhould a Man go about with never ſo ſet Study and Deſign to deſcribe ſuch a Natural Form of the Year as is that which is at preſent eſtabliſh'd, he could ſcarcely ever do it in ſo few Words again that were ſo fit and proper, ſo full and expreſs; eſpecially if, by *Signs*, in this place, *Months* are intended, for then we have here firſt the *Year*: and that ſubdivided into its uſual Parts, the four Quarters or *Seaſons*, the twelve *Signs* or Months, and *Days*; nay at the ſame time, from the 19th Verſe, we learn that this Eſtabliſhment is, within four days, as old as the World. But further, Gen. viii. 21, 22. *And the Lord ſaid in his heart, I will not again curſe the ground, ---- neither will I again ſmite any more every thing living as I have done. While the Earth remaineth, Seed-time and Harveſt, and Cold and Heat, and Summer and Winter, and Day and Night, ſhall not ceaſe.* This was pronounc'd upon *Noah*'s Sacrificing, at his coming forth of the Ark, after the Deluge was over: and implies, that there had indeed then lately been a mighty Confuſion of Things, for the time: an Interruption and Perturbation of the ordinary Courſe of them: and a Ceſſation and Suſpenſion of the Laws of Nature: but withall gives Security and Aſſurance that there ſhould never be the like any more to the End of the World: that for the future they ſhould all run again in their old Chanel: and that particularly there ſhould be the ſame *Viciſſitudes of Seaſons*, and *Alternations of Heat and Cold* that were *before the Deluge.*

*FINIS.*

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